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ABSTRACT

This report provides information on total Federal Research and Development (R and D) expenditures during the period of 1960-72. The report is divided into two parts. Part I gives an overall view of priorities funded by the Federal government. The total Federal R and D expenditures are arranged by functions. In addition, a brief statistical account is presented about the ratio of R and D expenditures to total outlays within each function during the period covered. Part II provides a detailed treatment of R and D expenditures, function by function. The sections are presented in descending order of total outlays for 1972. Under each major function, data are gathered for different subfunctions and their ratios to total outlays. The data for years previous to 1972 are compiled and presented according to subfunction. The arrangement of subfunctions under major function titles is in descending order based on 1972 funding. Important trends are noted and analyzed for each function. The tables are presented in the appendix for figures for each year during 1960-72 according to agency programs. (PS)

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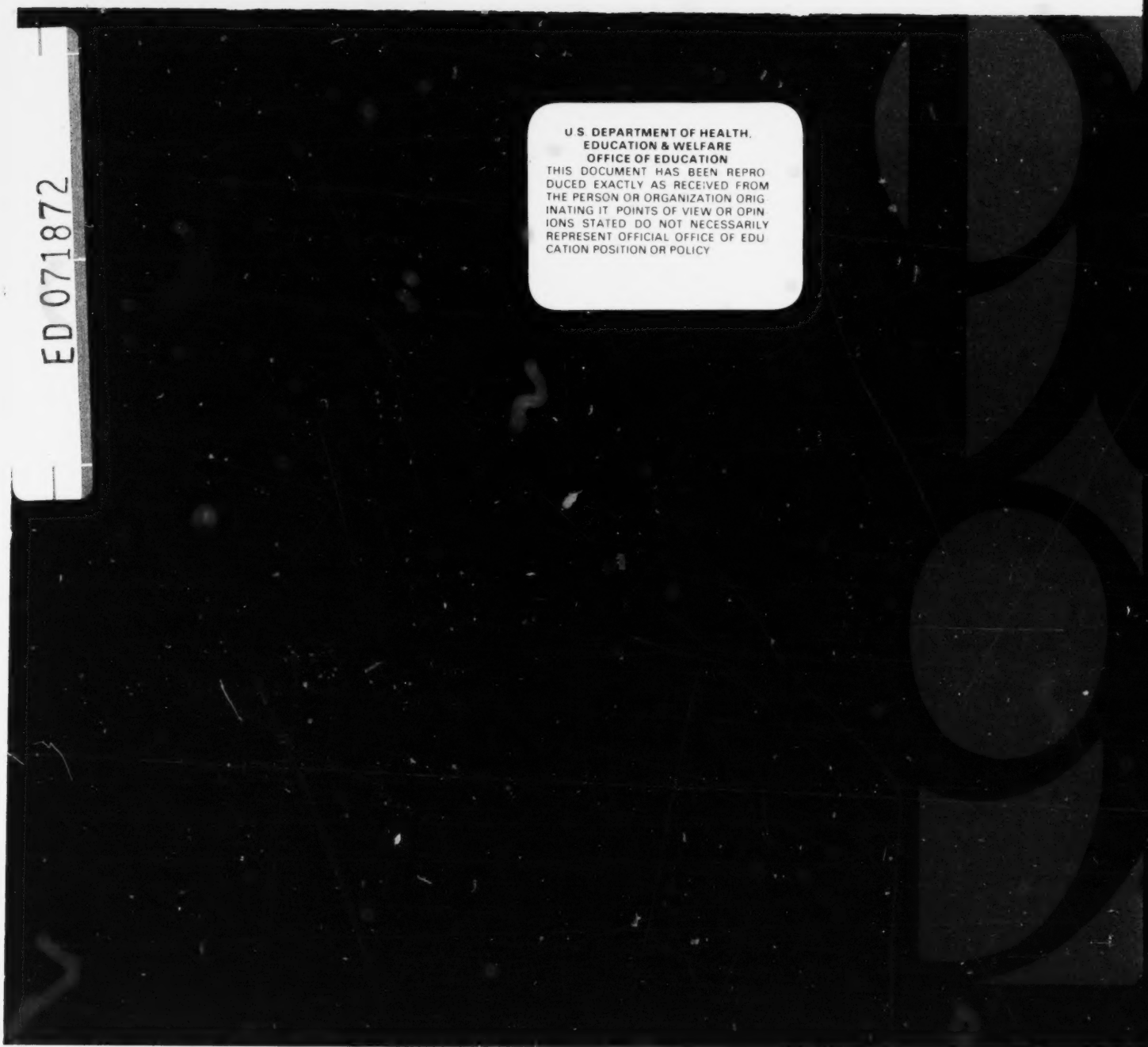

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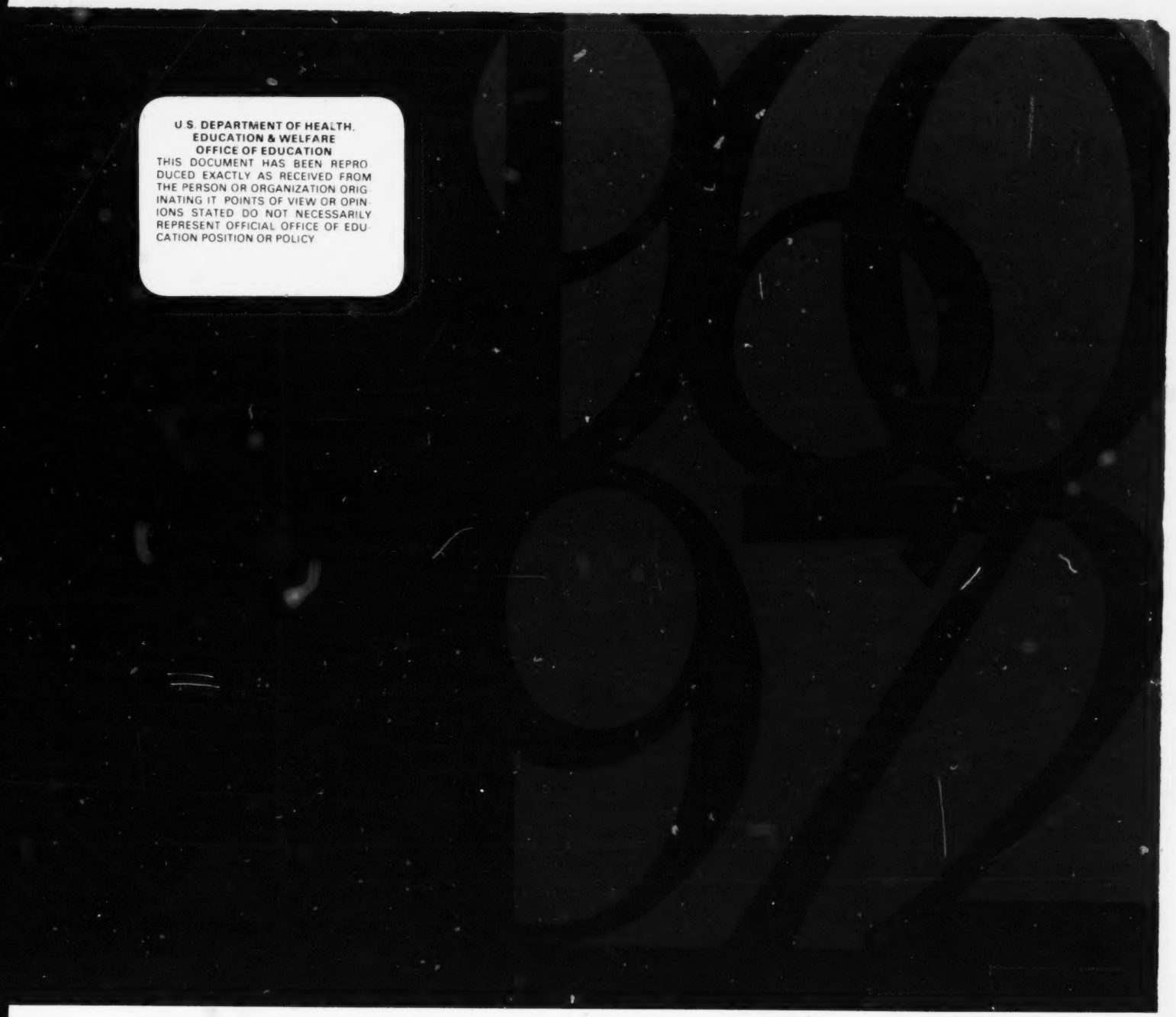

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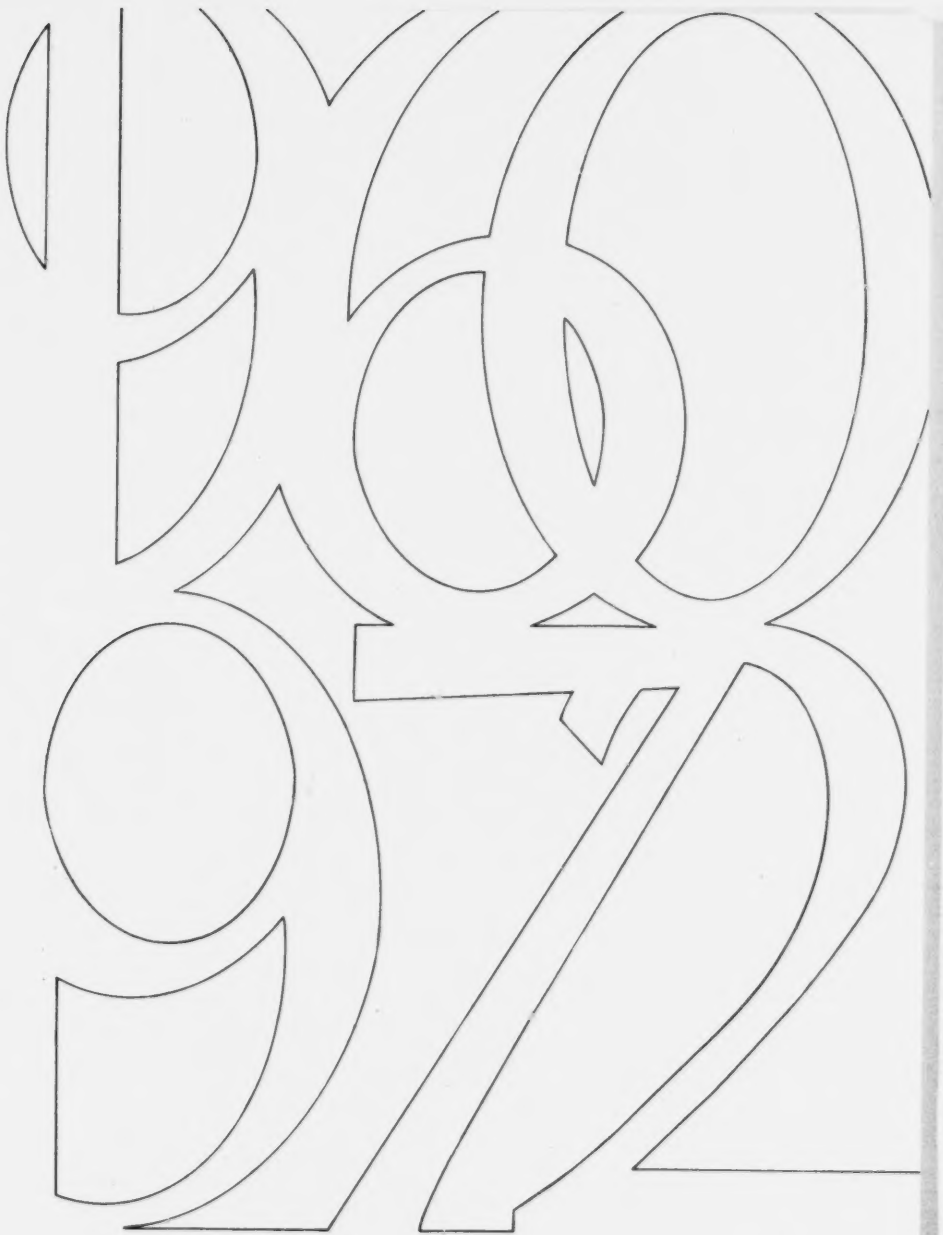

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FOREWORD

The Federal Government is currently the source of funds for 53 percent of all national R&D performance. The way Federal funds are directed affects the use of professional manpower, materials, supplies, and industrial capabilities, and more broadly, the quality of national life, national security, and economic welfare. Inevitably, the use of R&D funds is closely related to national goals and priorities.

Within the last decade a number of reports have been issued on the nature of such goals and the question of policy choices. Among those issued under Federal sponsorship are *Goals for Americans, 1960,* the report of President Eisenhower's Commission on National Goals, and the 1970 report of President Nixon's National Goals Research Staff, *Toward Balanced Growth: Quantity with Quality*. The present report adds to this literature.

Within the Federal Government the allocation of priorities is reflected by the amount of funding provided for each budget function. This report compares Federal R&D expenditures in the period 1960–72 by budget function with total Federal outlays for each function, analyzes trends and developments, and describes current R&D programs. It is the first report of this nature published by the National Science Foundation, although an annual series has been published by the Foundation on Federal R&D funding by agencies. The functional approach is offered in this report to help meet the growing need for data on which to determine the adequacy of functional R&D efforts in the light of national priorities.

The report was prepared in the Division of Science Resources Studies. General guidance for the study was provided by Thomas J. Mills, Leonard L. Lederman, and Kenneth Sanow.

Charles E. Falk
Director, Division of Science
Resources Studies

July 1971

acknowledgments

This report was compiled and published under the direction of Benjamin Olsen, Study Director, Government Studies Group. Jane Pugh and Eleanor Stoddard held major responsibility for organizing and analyzing the data, and developing charts, tables, and text. Wayne Zajac assisted in writing the text and developing charts. Dorothy Knott and Arlene Peterson aided in the preparation of statistical and graphic material.

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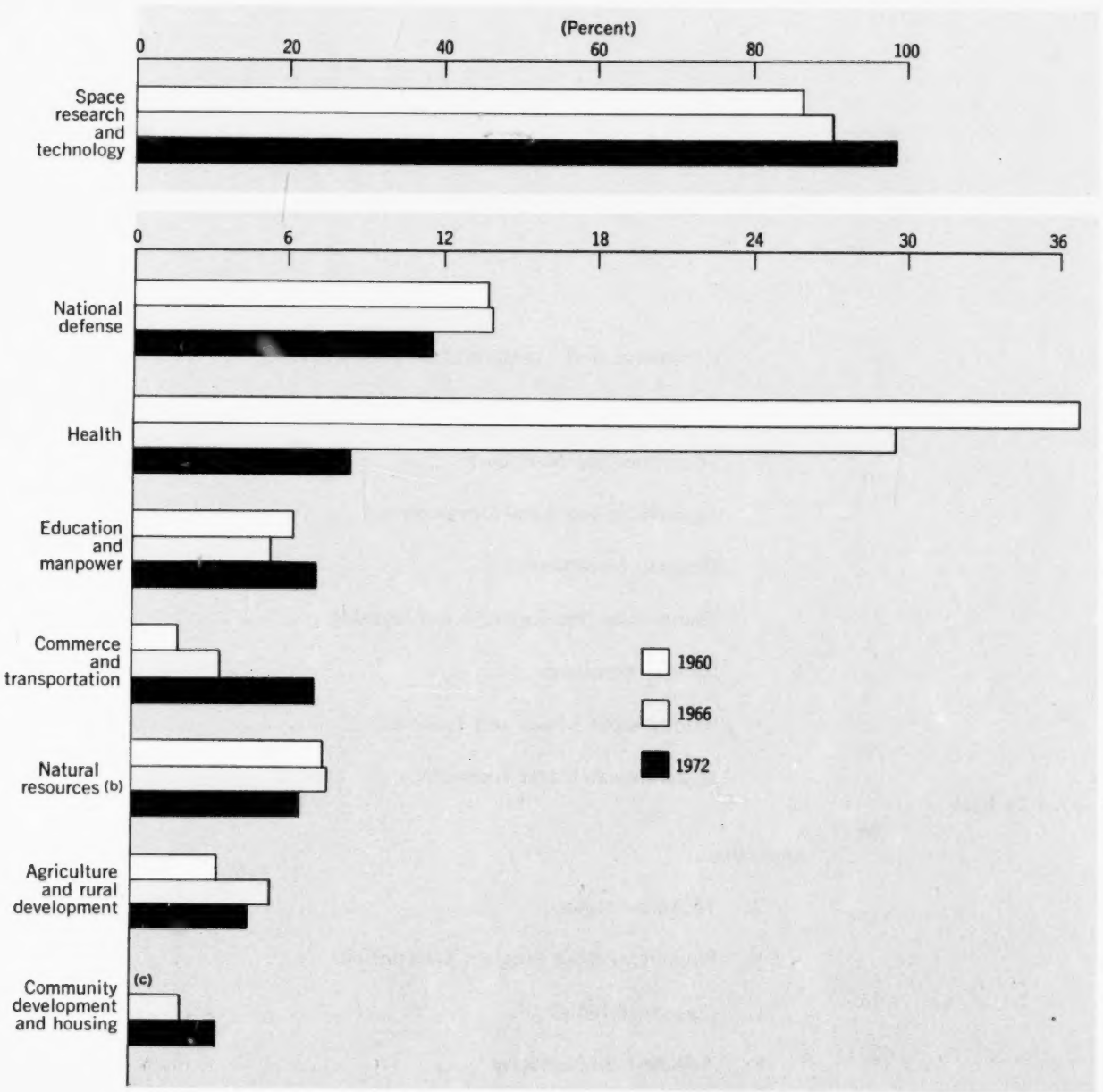
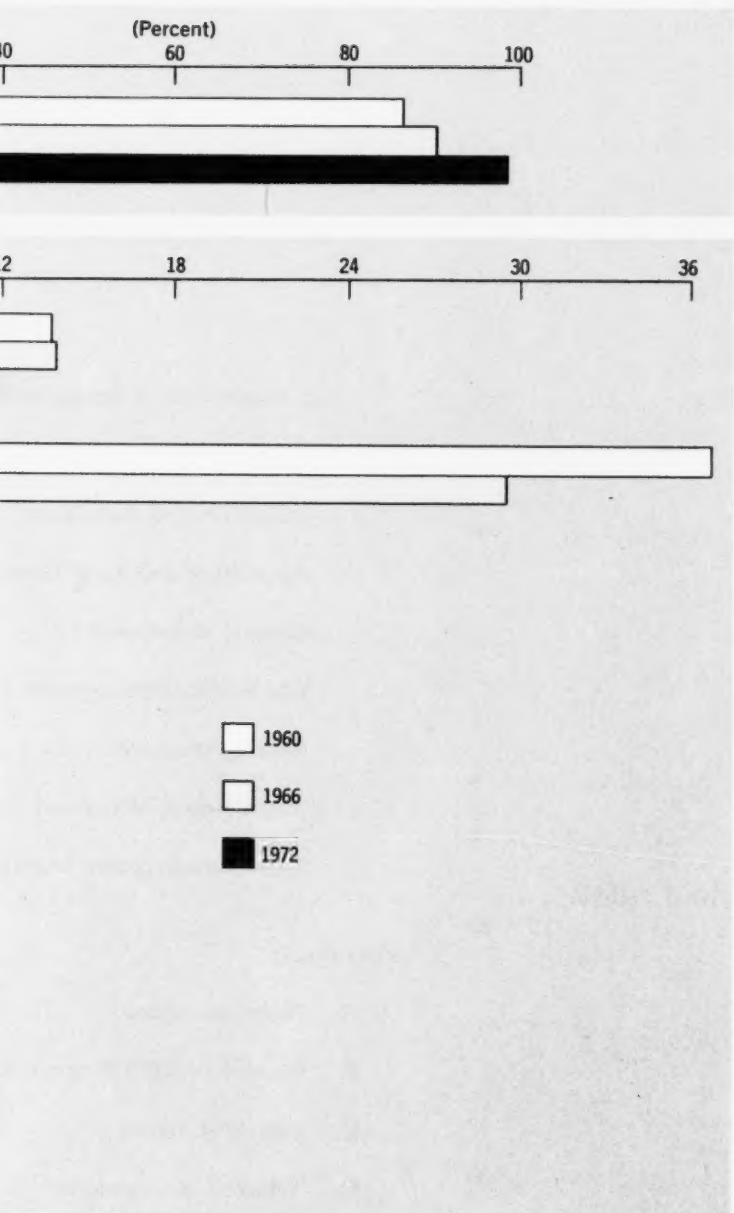


SOURCES: Office of Management and Budget; National Science Foundation



FEDERAL R&D EXPENDITURES FOR EACH FUNCTION AS A PERCENT OF TOTAL FEDERAL OUTLAYS FOR THAT FUNCTION[a] FY 1960, 1966 and 1972 (est.)

[a] Not shown are international affairs, veterans benefits and services, general government, and income security, where the ratio was less than 1 percent throughout the 1960-72 period.

[b] The ratios are based on total outlays as given in the **1972 Budget** (gross outlays minus offsetting receipts). However, there are relatively large offsetting receipts in the natural resources area (from the lease of mineral lands, disposal of public lands, and sales of power and timber). Therefore, the ratio of R&D expenditures to **gross** outlays (excluding receipts) would show a lower level but a generally upward trend, as follows: for 1960, 4.2%; for 1966, 5.0%; for 1972, 5.0%.

[c] No R&D expenditures were reported in 1960.

get; National Science Foundation

HIGHLIGHTS

- During the early and mid-1960's Federal expenditures for research and development rose steadily: from $7.3 billion in 1960 to $16.3 billion in 1968. They declined thereafter to $15.2 billion in 1970. Since then R&D expenditures have moved up to an estimated level of $15.7 billion in 1972.

- Relative to total Federal budget expenditures, those for research and development have experienced a significant reduction in emphasis since the mid-1960's. The ratio of R&D expenditures to total Federal outlays rose from 8.5 percent in 1960 to a high point of 12.4 percent in 1965. Since then the ratio has decreased each year; the 7.4-percent ratio estimated for 1972 is the lowest in the entire 1960–72 period.

- Within the 12 functions covering major Federal activities, the ratio of R&D expenditures to total outlays varies widely because the applicability of R&D programs to the various functional areas obviously differs. (See facing chart.) Such programs as those connected with income security and general government, for example, are not associated with large-scale R&D activities in the same way as programs that rely on technological advances in functional areas such as space and national defense. Comparisons of ratios are useful, nonetheless, in providing some insights into the extent to which R&D programs are contributing to national goals.

- Ratios in most cases represent small parts of function totals, but for space the ratio has always been large since, by definition, virtually all space activities are classified as research and development; in the 1970–72 period they amount to 99 percent of the total.

- Health is another function of special note in that its estimated ratio of 8 percent in 1972 compares with 30 to 41 percent in the 1960–66 period. The change came about not because of a decline in R&D programs but because of the rapid increase in other support programs, notably Medicare and Medicaid.

INTRODUCTION

This report is designed to assist in the understanding of national R&D priorities. It provides a factual analysis of Federal R&D activities by broad functional categories to serve as a background for policy considerations. It is based on *The Budget of the United States Government, Fiscal Year 1972*, the basic Government planning document reflecting funding priorities.

Outlays are classified by the Office of Management and Budget (OMB) into functions and subfunctions that indicate broad purposes. The amounts allocated to each function keep changing both in absolute dollars and in their relationship to the total, and a study of these changes over time gives a perspective on shifting emphases in Government responsibilities. R&D activities are included in each functional classification and can be compared across functional lines.

The report compares Federal outlays by functional budget categories with Federal R&D expenditures within each of the categories for fiscal years 1960 to 1972. It is organized in two parts: part I, which is concerned with broad trends in and relationships between total Federal outlays by functions and R&D expenditures (excluding R&D plant) by functions, as well as with important changes in the ratio of R&D expenditures to total outlays within each function; and part II, which is focused on a detailed treatment of R&D expenditures, function by function.

The latest functional totals and agency organization have been used as the base and data have been reclassified for earlier years, where necessary, to show trends. Total outlays and R&D expenditures are given by subfunction, e.g., air transportation, water transportation, as well as by function. R&D activities by subfunctions are further broken out by agency sponsors and/or programs from 1960 through 1972, and brief descriptions are given of all current R&D programs falling under the various function-subfunction categories.[1]

[1] More detailed program descriptions for a number of these R&D programs can be found in: Office of Management and Budget, *The Budget of the United States Government Appendix, Fiscal Year 1972* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office.)

This analysis uses budget rather than other categories since the budget offers an official functional breakout covering the entire Federal establishment. It provides a readily available means to compare Federal R&D expenditures with total Federal outlays on other than an agency basis.

The budget arrangement of agencies and agency subdivisions under each of the functional categories has been followed *in toto* in the distribution of R&D programs. This means that each function embraces the agency components whose *primary* mission is related to that function. The health function, for example, includes only those agency units whose primary function is health-related. The report does not include under health all funds spent on health-related research and development, but only the R&D dollars spent by agencies or agency subdivisions whose *primary* mission is related to health, e.g., the Department of Health, Education, and Welfare's National Institutes of Health. The medical research programs of the Department of Defense and the National Aeronautics and Space Administration are placed under their primary functions of national defense and space research and technology, respectively. In the case of education and manpower, for another example, the report does not reflect the full Federal contribution to academic research and development, but it does include R&D expenditures by agencies whose primary function is to improve academic instruction or to generate knowledge, e.g., the National Science Foundation and HEW's Office of Education. Other Federal expenditures for academic research and development are classified under the primary function of the agency providing the support. For example, the Department of Housing and Urban Development R&D expenditures are included under the community development and housing function.

A study that combined programs by a method that allowed each program to relate to multiple functions would find functions overlapping and adding to more than 100 percent of the budget total. But data in this analysis, based on the OMB classifications, are additive to 100 percent of the Federal budget, and therefore priorities can be shown as percents of the total without double counting.

Overall outlays in this study have been adjusted to *exclude* interest costs. Total Federal outlays, as presented in the budget, include interest. The interest function is excluded because it is a way of financing other functions rather than a function in its own right. Thus, the ratio of total R&D expenditures to total Federal outlays will be slightly higher in this report than it will be in any analysis based on total outlays ir will represent somewhat higher they do in OMB analyses; e.g., outlays in 1972 but OMB places i

Since the budget does not pro were used. (Outlays should not the President's total budget req from expenditures only in that th enter into the R&D expenditure p

For the 1960–69 period, data responses to the surveys of Fede National Science Foundation. yearly by agencies,[3] but in this functional basis, grouping agenc and subcategories as OMB grou R&D data for the 1970–72 perio agencies to OMB for its special ments for known differences in report or to account for revision data to OMB. Data for 1960 t estimates of the current fiscal y President for July 1, 1971 through

Functions taken from the Fed titled or subfunctions differently Federal budget have done. The p are organized along officially det the data in a way that permit should that better serve another p

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[2] Office of Management and Budget, *The* (Washington, D.C. 20402: Supt. of Docume

[3] National Science Foundation, *Federal Activities*, Vols. I through XIX (Washingt Printing Office.)

[4] Office of Management and Budget, *Sp Fiscal Year 1972*, "Special Analysis R, Federa 20402: Supt. of Documents, U.S. Governme

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Since the budget does not provide expenditure figures by functions, outlays were used. (Outlays should not be confused with obligations, which reflect the President's total budget request, a higher figure in 1972.) Outlays differ from expenditures only in that they include net lending. Net lending does not enter into the R&D expenditure picture.

For the 1960–69 period, data on R&D expenditures are taken from agency responses to the surveys of Federal R&D activities conducted annually by the National Science Foundation. The Foundation publishes these R&D data yearly by agencies,[3] but in this report the data have been organized on a functional basis, grouping agency R&D programs under the same categories and subcategories as OMB groups the more general agency programs. The R&D data for the 1970–72 period are based on information submitted by the agencies to OMB for its special analysis of R&D programs[4] with some adjustments for known differences in reporting to OMB and the *Federal Funds* report or to account for revisions made by agencies after their submission of data to OMB. Data for 1960 through 1970 are actual, for 1971 they are estimates of the current fiscal year, and for 1972 they are requests of the President for July 1, 1971 through June 30, 1972.

Functions taken from the Federal budget could, of course, be differently titled or subfunctions differently grouped within them, as some analysts of the Federal budget have done. The purpose of this report is to provide data that are organized along officially determined lines. We have, however, presented the data in a way that permits regrouping under differing classifications should that better serve another purpose.

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[2] Office of Management and Budget, *The Budget of the United States Government, Fiscal Year 1972* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office), p. 7.

[3] National Science Foundation, *Federal Funds for Research, Development, and Other Scientific Activities*, Vols. I through XIX (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office.)

[4] Office of Management and Budget, *Special Analyses, Budget of the United States Government, Fiscal Year 1972*, "Special Analysis R, Federal Research and Development Programs" (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office), p. 271ff.

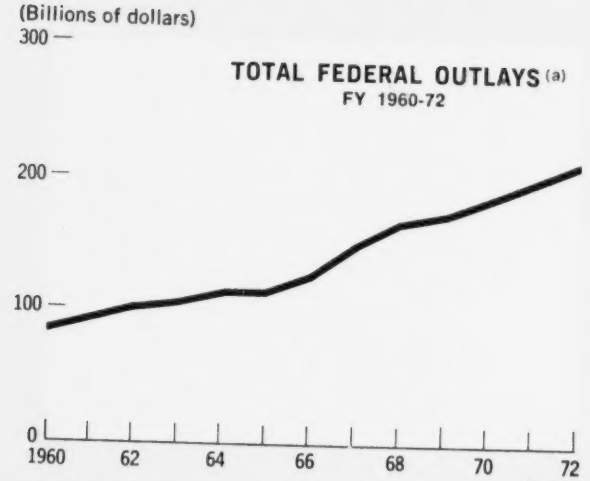
Functional Categories Taken from
THE BUDGET OF THE UNITED STATES
GOVERNMENT, FISCAL YEAR 1972*

* Listed in descending order of 1972 total outlays.

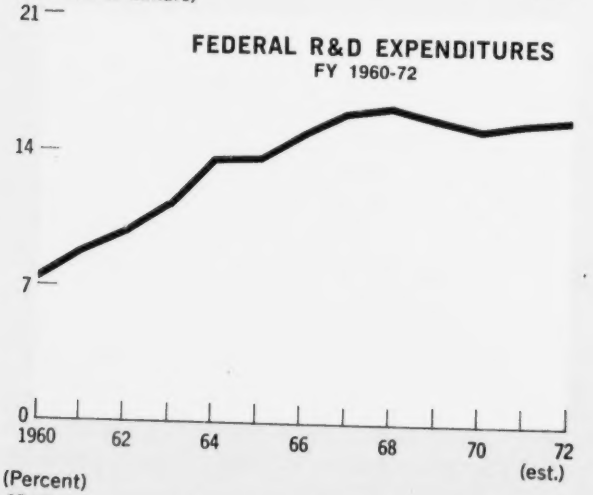
National defense:	Department of Defense-military; military assistance; atomic energy; defense-related activities
Income security:	Retirement and social insurance; public assistance; social and individual services
Health:	Development of health resources; providing or financing medical services; prevention and control of health problems
Commerce and transportation:	Air transportation; water transportation; ground transportation; postal service; advancement of business; area and regional development; regulation of business
Veterans benefits and services:	Income security for veterans; veterans education, training, and rehabilitation; veterans housing; hospital and medical care for veterans; other veterans benefits and services
Education and manpower:	Elementary and secondary education; higher education; vocational education, manpower training and employment services; science education and basic research; other education aids; other manpower aids
Agriculture and rural development:	Farm income stabilization; rural housing and public facilities; agricultural land and water resources; research and other agricultural services
General government:	Legislative functions; judicial functions; executive direction and management; central fiscal operations; general property and records management; central personnel management; law enforcement and justice; national capital region; other general government
Community development and housing:	Concentrated community development; community environment; community facilities; community planning and administration; low and moderate income housing aids; maintenance of the housing mortgage market
Natural resources:	Water resources and power; land management; mineral resources; recreational resources; other natural resources programs
International affairs and finance:	Conduct of foreign affairs; economic and financial assistance; foreign information and exchange activities; Food for Peace
Space research and technology:	Manned space flight; space science and applications; space technology; aircraft technology; supporting space activities.

Part I

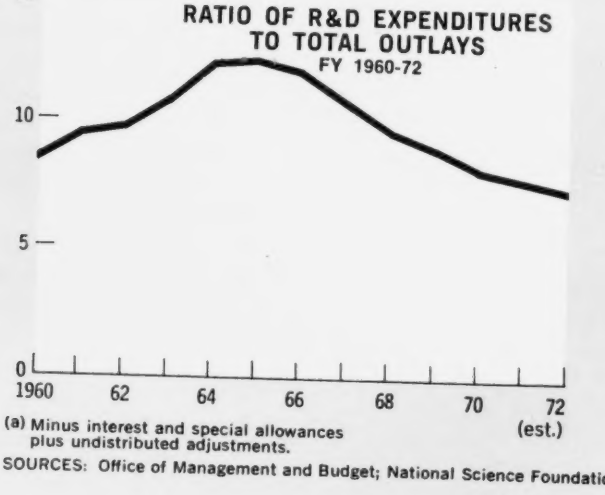
RELATIONSHIPS BETWEEN FUNCTIONS



TOTAL FEDERAL OUTLAYS [a]
FY 1960-72



FEDERAL R&D EXPENDITURES
FY 1960-72



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS
FY 1960-72

(a) Minus interest and special allowances plus undistributed adjustments.

SOURCES: Office of Management and Budget; National Science Foundation

OVERALL TRENDS

Total Federal outlays and Federal R&D bled between 1960 and 1972. Total ou billion, and R&D expenditures rose from $

The growth rates of these two totals periods:

	Average annual pe
	19
Current dollars	
Total Federal outlays	
Federal R&D expenditures	
Constant dollars [1]	
Total Federal outlays	
Federal R&D expenditures	

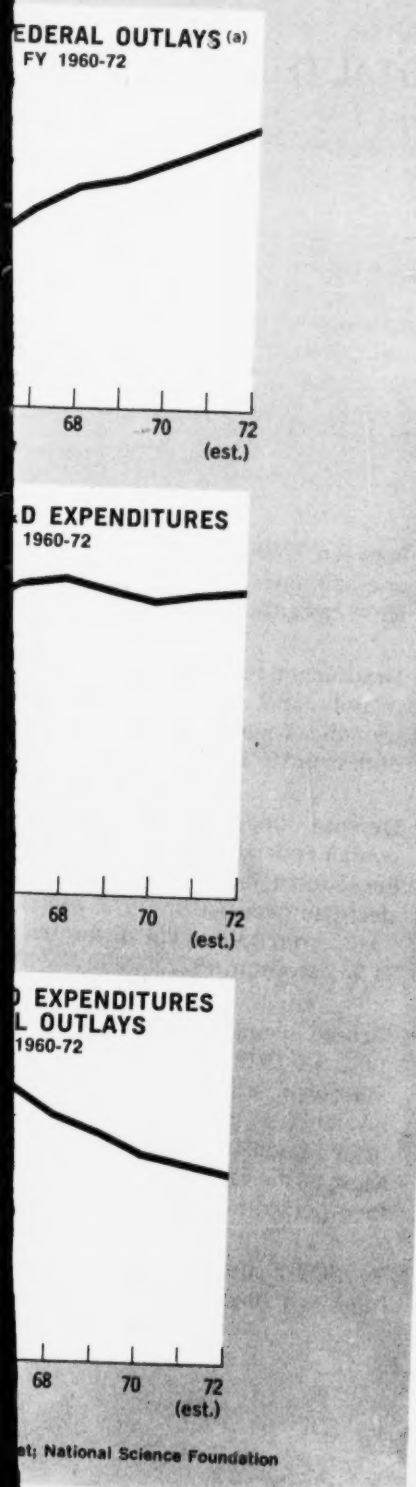
[1] The GNP implicit price deflator is used to determine
[2] Not available.

- In the 1960–72 timespan total Federal o rate than R&D expenditures—7.8 perce ent stages within this period, the rates o more widely, as shown above.

- Total Federal outlays grew moderately in showed an accelerated growth after the creased funding in the fields of income s ever, conversion to constant dollars inc ture.) The continued rise in the current of substantial increases in a number of rity.

- The comparatively steep growth rate fo 1966 was chiefly influenced by the expa R&D work in health also grew significantl average annual growth rate reflected the than any other factor.

- The result has been a decline in the ra Federal budget outlays since 1965 when t ratio of 7.4 percent estimated for 1972 is



OVERALL TRENDS

Total Federal outlays and Federal R&D expenditures both more than doubled between 1960 and 1972. Total outlays rose from $86 billion to $211 billion, and R&D expenditures rose from $7.3 billion to $15.7 billion.

The growth rates of these two totals were as follows for selected time periods:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Current dollars				
Total Federal outlays	6.6	9.9	8.2	5.8
Federal R&D expenditures	12.7	.3	1.4	2.2
Constant dollars [1]				
Total Federal outlays	5.0	5.6	([2])	([2])
Federal R&D expenditures	11.0	−3.6	([2])	([2])

[1] The GNP implicit price deflator is used to determine constant dollars.
[2] Not available.

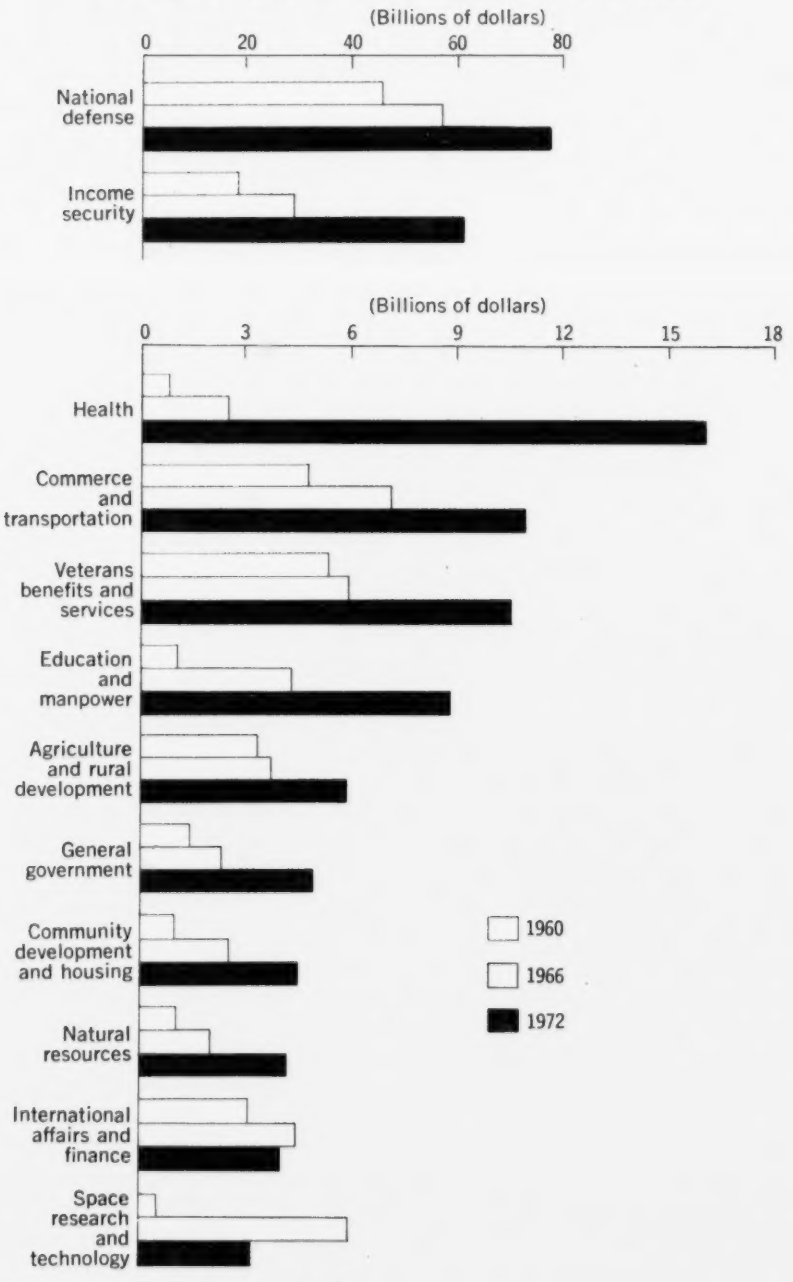
- In the 1960–72 timespan total Federal outlays grew at a somewhat greater rate than R&D expenditures—7.8 percent versus 6.6 percent. But at different stages within this period, the rates of growth for the two totals varied far more widely, as shown above.

- Total Federal outlays grew moderately in the earlier years of the decade but showed an accelerated growth after the mid-1960's because of greatly increased funding in the fields of income security, defense, and health. (However, conversion to constant dollars indicates a steadier real growth picture.) The continued rise in the current (1970–72) period occurs because of substantial increases in a number of fields, particularly in income security.

- The comparatively steep growth rate for R&D expenditures from 1960 to 1966 was chiefly influenced by the expansion of space programs, although R&D work in health also grew significantly. After 1966 the sharp drop in the average annual growth rate reflected the cutback in space programs more than any other factor.

- The result has been a decline in the ratio of R&D expenditures to total Federal budget outlays since 1965 when the ratio reached 12.4 percent. The ratio of 7.4 percent estimated for 1972 is the lowest occurring in this series.

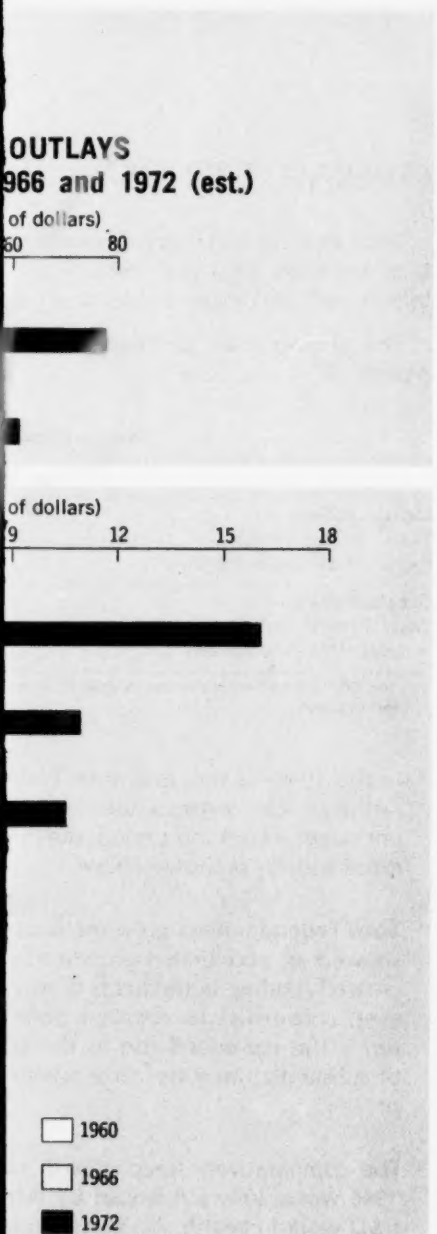
TOTAL FEDERAL OUTLAYS BY FUNCTION, FY 1960, 1966 and 1972 (est.)



SOURCE: Office of Management and Budget

TOTAL FEDERA

- Between 1960 and 19 one-half times, or by $ fense categories.
- The budget has been security and, second sporadic. Together the outlays in 1972.
- Defense outlays betwe overall Federal budge Subsequent rapid yea decrease occurred in 1972. From 53 percen to 37 percent in 1972.
- Income security has 1972. Its 1972 share More than four-fifths insurance to protect from retirement, disa Most of the rest are fo be expected to continu
- By 1972 health will h 1966 and 1970 its gro



TOTAL FEDERAL OUTLAYS BY FUNCTION

- Between 1960 and 1972 the overall budget will have grown almost two and one-half times, or by $125 billion. Three-fourths of this increase is in nondefense categories.

- The budget has been most heavily influenced by the growth of income security and, secondly, by national defense, where growth has been sporadic. Together these are expected to account for 65 percent of budget outlays in 1972.

- Defense outlays between 1960 and 1972 have grown less rapidly than the overall Federal budget. They showed an actual decline from 1964 to 1965. Subsequent rapid yearly rises were reversed again in 1970 and a further decrease occurred in 1971 with a slight rise in the amount requested for 1972. From 53 percent of the budget in 1960, defense is expected to drop to 37 percent in 1972.

- Income security has grown faster than the overall budget from 1960 to 1972. Its 1972 share is estimated at 29 percent, from 21 percent in 1960. More than four-fifths of income security payments are now concerned with insurance to protect the work force against total loss to income resulting from retirement, disability, death of the breadwinner, or unemployment. Most of the rest are for public assistance. The income security function can be expected to continue growing as social needs increase.

- By 1972 health will have multiplied to 21 times its 1960 outlays. Between 1966 and 1970 its growth rate was the highest of any budget function. This

situation chiefly reflects the Federal assumption of responsibility to help pay the hospital and medical bills of the Nation's aged and poor. By 1972 more than three-fourths of the health outlays are expected to be for Medicare and Medicaid. Such outlays began in 1966 and marked the beginning of a significant rise. The 1972 health share of total outlays is estimated at 8 percent, compared with 1 percent in 1960.

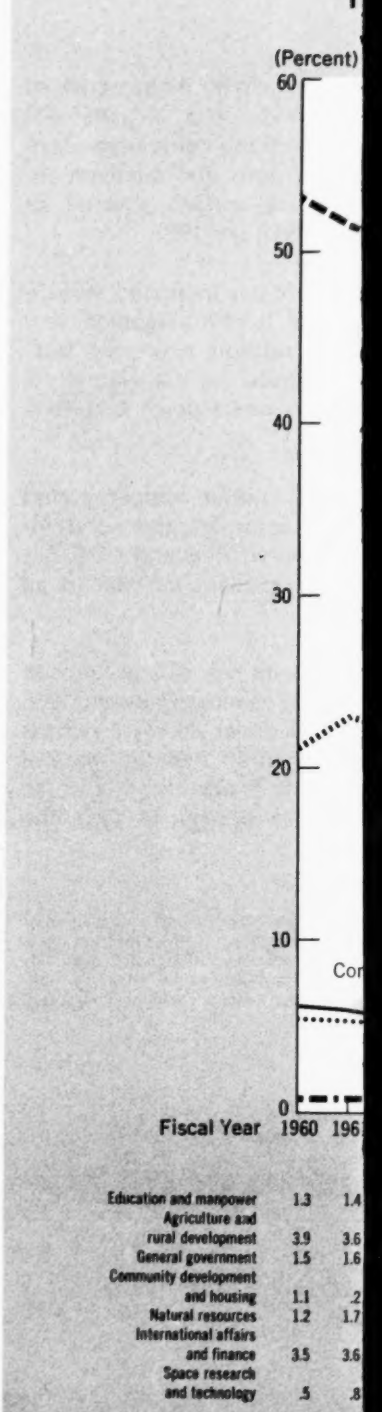
- Commerce and transportation is expected to double between 1960 and 1972. Currently the commerce and transportation function is chiefly made up of outlays for ground transportation (highways) and air transportation (airways and airports). Throughout the 1960–72 period commerce and transportation represented 5 percent to 7 percent of total outlays.

- Veterans benefits and services outlays scarcely grew in the 1960–66 period but rose for 1966–70 at the same rate as the overall budget. Outlays reflect the added costs of veterans payments as a result of the Viet Nam war, and in the current period they continue to rise because of increases in outlays for compensation, pensions, education, and medical services. For 1960–72 the veterans benefits share of the Federal total remained between 4 percent and 6 percent.

- Education and manpower, the sixth budget function in size of outlays in the 1972 budget, will have grown almost eight times in the 1960–72 period. At every stage it showed faster growth than overall Federal outlays, largely resulting from a range of new programs to improve the education of the Nation's youth but also as a result of new manpower training programs. Its share of total Federal outlays rose from 1 percent in 1960 to an estimated 4 percent for 1972.

- In the 1960–66 period agriculture and rural development scarcely increased at all. However, the agriculture function grew in the 1966–70 years as a result of greater outlays for farm income stabilization. The expected drop in 1971 results mainly from changes in farm income stabilization outlays. As a percent of total outlays the agriculture function moved down from almost 4 percent in 1960 to less than 3 percent for 1972.

- General government showed faster growth than overall Federal outlays from 1960 to 1966 and 1970 to 1972 and about the same growth for the period 1966–70. Current increases reflect activity in law enforcement and crime prevention and improvements in tax collection and administration. The general government share was 1½ percent in 1960 and somewhat more than 2 percent in the 1972 budget.



Education and manpower	1.3	1.4
Agriculture and rural development	3.9	3.6
General government	1.5	1.6
Community development and housing	1.1	.2
Natural resources	1.2	1.7
International affairs and finance	3.5	3.6
Space research and technology	.5	.8

SOURCE: Office of Managemen

ıssumption of responsibility to help
he Nation's aged and poor. By 1972
outlays are expected to be for Medi-
n in 1966 and marked the beginning
hare of total outlays is estimated at 8
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cted to double between 1960 and
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7 percent of total outlays.

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d medical services. For 1960–72 the
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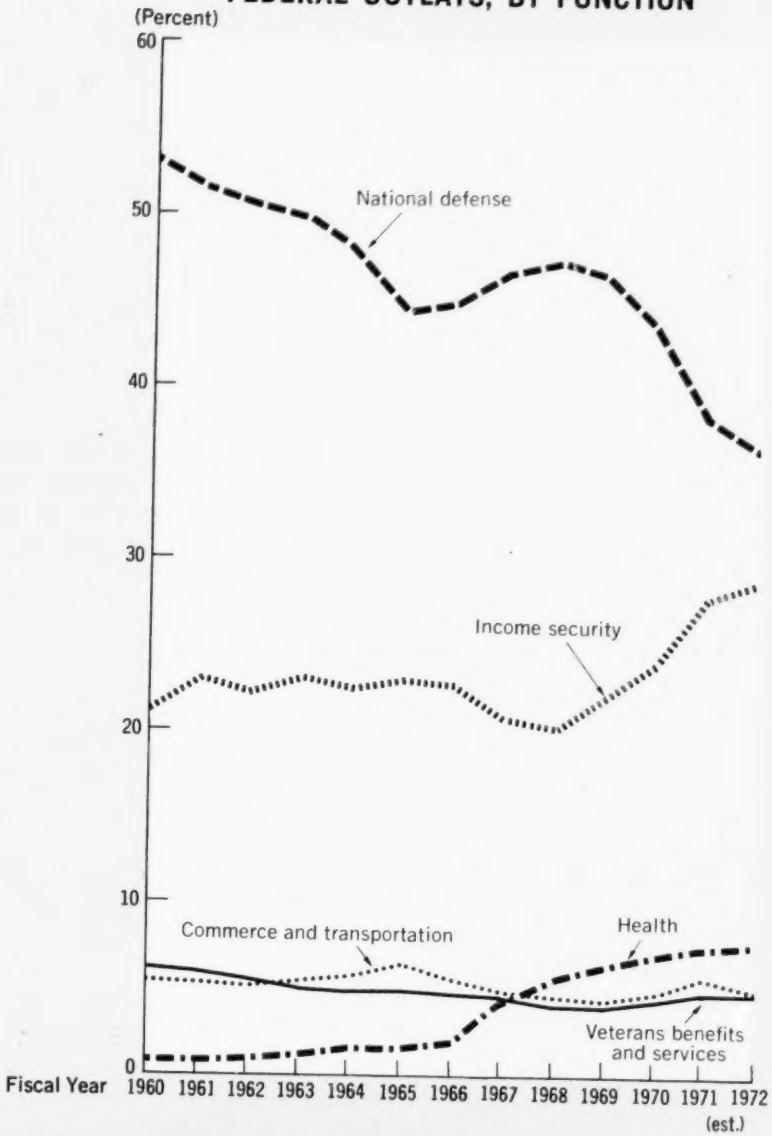
TRENDS IN DISTRIBUTION OF TOTAL FEDERAL OUTLAYS, BY FUNCTION



	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 (est.)
Education and manpower	1.3	1.4	1.4	1.4	1.6	2.1	3.4	3.9	4.0	3.8	3.9	4.2	4.2
Agriculture and rural development	3.9	3.6	4.1	4.9	4.6	4.3	2.9	2.9	3.5	3.6	3.4	2.6	2.7
General government	1.5	1.6	1.6	1.7	1.8	2.0	1.8	1.7	1.5	1.6	1.8	2.2	2.4
Community development and housing	1.1	.2	.6	− .8	− .2	.3	2.1	1.7	2.4	1.1	1.6	1.9	2.1
Natural resources	1.2	1.7	1.6	1.4	1.7	1.8	1.6	1.2	1.0	1.2	1.3	1.3	2.0
International affairs and finance	3.5	3.6	4.4	3.9	3.7	3.9	3.5	3.0	2.7	2.2	1.9	1.8	1.9
Space research and technology	.5	.8	1.2	2.4	3.7	4.6	4.7	3.6	2.8	2.4	2.0	1.7	1.5

SOURCE: Office of Management and Budget

- Community development and housing reveals significantly higher rates of growth during the 1960–66 and 1970–72 periods than in 1966–70. Recent increases result from community development and community environment activities as well as from increased aids to low- and moderate-income housing. However, the share in total Federal outlays showed an increase only from 1 percent to 2 percent between 1960 and 1972.

- Natural resources has grown sporadically overall but has increased steadily in water resources and power outlays as well as in land management and recreational resources.[1] Deductions for offsetting receipts make net total outlays lower than actual total activities encompassed by the natural resources function. The share in total Federal outlays was 1 percent in 1960 and an estimated 2 percent in 1972.

- International affairs and finance is rising in the current budget period chiefly through supporting assistance to friendly countries and Food for Peace programs, following an absolute decline between 1968 and 1970. But the share of this function has dropped from 3½ percent in 1960 to an expected 2 percent in 1972.

- Space research and technology had the highest growth rate of any function in the 1960–66 period, but it registered an absolute decline between 1966 and 1970 that continues in the current period. This dollar decrease reflects the phasing out of the manned lunar landing program. In 1960 the share of space in total Federal outlays was just one-half of 1 percent; it rose to almost 5 percent in 1966 but is expected to be 1½ percent in 1972, the lowest of any function.

[1] Natural resources would reflect substantial increases in its yearly totals if most of the non-defense-oriented portion of atomic energy outlays were included under this function. In the OMB classification system all atomic energy outlays are included under national defense even though approximately one-half of such outlays are considered by the Atomic Energy Commission to be primarily non-defense-oriented—about $1.2 billion estimated for 1972. Most of these outlays could be considered as part of the natural resources function.

Function	Total Average annu
Total	
National defense	
Income security	
Health	
Commerce and transportation	
Veterans benefits and services	
Education and manpower	
Agriculture and rural developmen	
General government	
Community development and hou	
Natural resources	
International affairs and finance	
Space research and technology	

[1] Listed in descending order of 1972

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In 1960 the share of
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sion to be primarily non-
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Total Federal outlays by function: [1]
Average annual percent change in selected periods

Function	1960–66	1966–70	1970–71	1971–72
Total	6.6	9.9	8.2	5.8
National defense	3.6	9.0	−4.8	1.4
Income security	8.1	10.8	26.8	9.3
Health	22.0	50.4	14.9	7.2
Commerce and transportation	6.9	6.7	22.9	−4.4
Veterans benefits and services	1.5	10.0	14.9	6.8
Education and manpower	25.0	14.4	13.9	6.1
Agriculture and rural development	1.7	13.9	−15.1	10.3
General government	9.5	9.8	31.3	13.4
Community development and housing	18.2	2.9	30.1	16.5
Natural resources	12.3	5.5	6.3	61.0
International affairs and finance	6.6	−5.6	.4	12.4
Space research and technology	56.5	−10.9	−10.2	−6.5

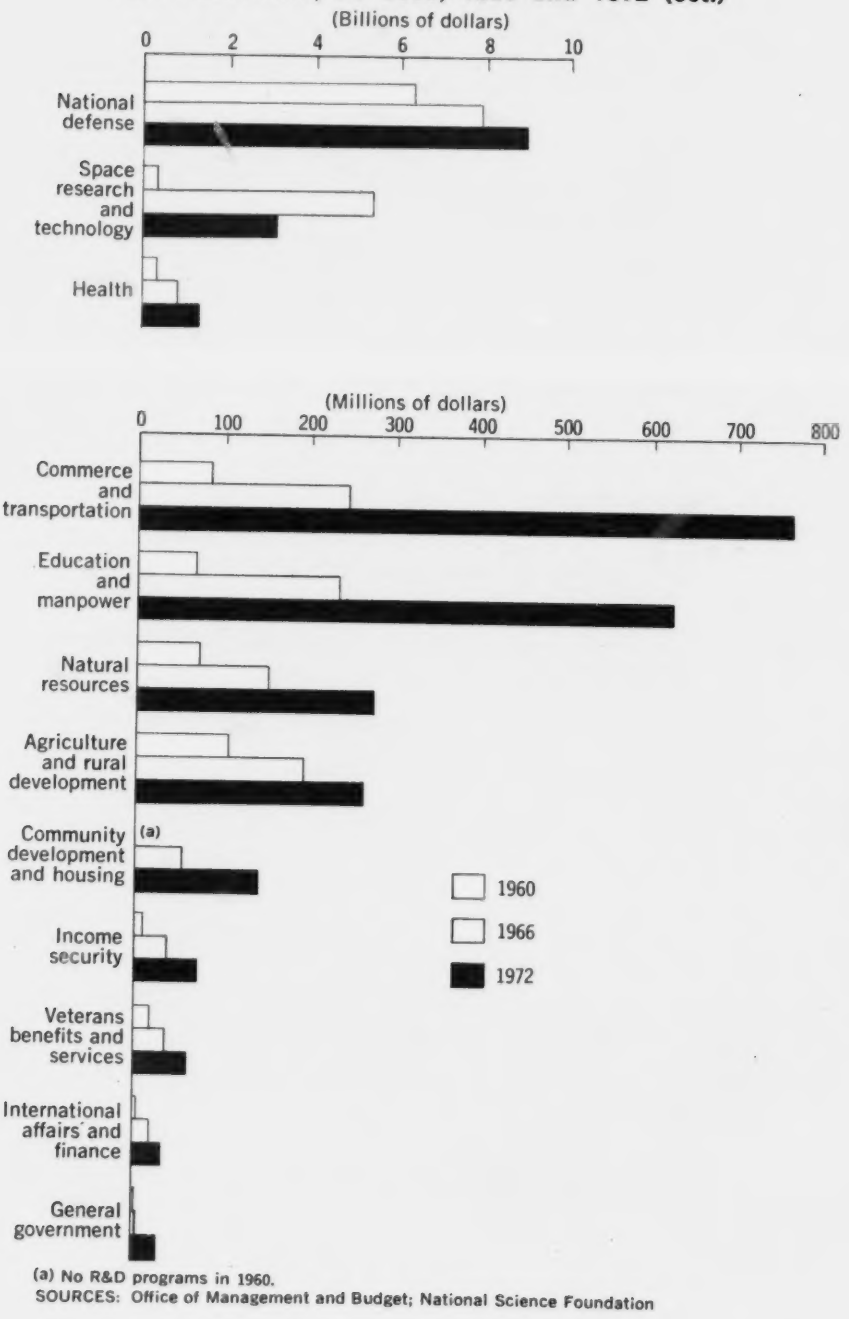
[1] Listed in descending order of 1972 total outlays.

Growth rate comparisons by function	1960–66	1966–70	1970–71
Above overall budget:	Income security Health Commerce and transportation Education and manpower General government Community devel. and housing Space research and technology Natural resources	Income security Health Education and manpower Agriculture and rural development	Income security Health Commerce and transport Education and manpowe General government Community devel. and ho Veterans benefits and se
Below overall budget:	National defense Veterans benefits and services Agriculture and rural development	National defense Commerce and transportation Community devel. and housing International affairs and finance Space research and technology Natural resources	National defense Agriculture and rural dev International affairs and Space research and tech Natural resources
Same as overall budget:	International affairs and finance	General government Veterans benefits and services	

–66	1966–70	1970–71	1971–72
nsportation npower nt and housing d technology	Income security Health Education and manpower Agriculture and rural development	Income security Health Commerce and transportation Education and manpower General government Community devel. and housing Veterans benefits and services	Income security Health Education and manpower Agriculture and rural development General government Community devel. and housing Natural resources International affairs and finance Veterans benefits and services
nd services al development	National defense Commerce and transportation Community devel. and housing International affairs and finance Space research and technology Natural resources	National defense Agriculture and rural development International affairs and finance Space research and technology Natural resources	National defense Commerce and transportation Space research and technology
s and finance	General government Veterans benefits and services		

FEDERAL R&D EX

FEDERAL R&D EXPENDITURES BY FUNCTION, FY 1960, 1966 and 1972 (est.)



(a) No R&D programs in 1960.
SOURCES: Office of Management and Budget; National Science Foundation

- The three principal func
1960–72 period have be
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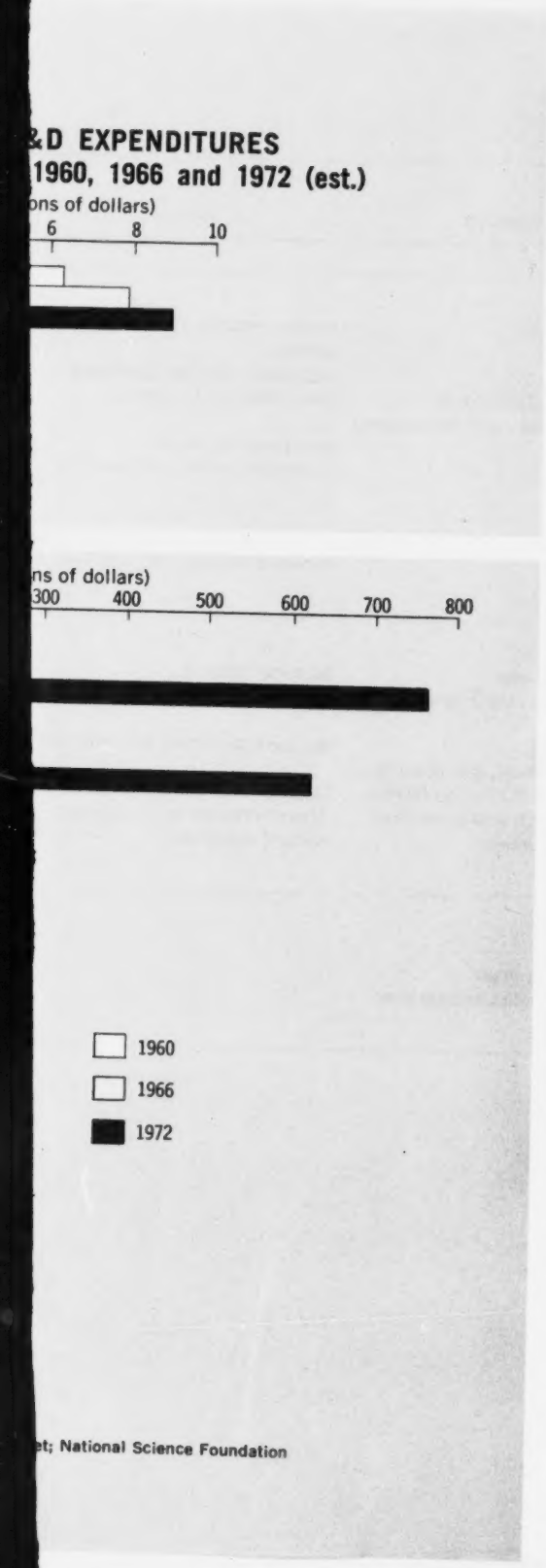

FEDERAL R&D EXPENDITURES BY FUNCTION

- The three principal functions to influence R&D spending throughout the 1960–72 period have been national defense, space research and technology, and health. Together they are expected to make up 86 percent of total R&D expenditures in 1972.

- The same three functions led in R&D expenditures throughout the decade and in the same order.

- National defense has consistently accounted for the bulk of R&D expenditures, but its share fell from 87 percent of the Federal R&D total in 1960 to a low point of 53 percent in 1966 when expenditures for space were at their height. In subsequent years the defense share rose (as space expenditures declined) but has leveled off since 1968 at 57 to 58 percent.

- Space research and technology experienced a dramatic rise in funds from 1960 to 1966 followed by sharp cutbacks. From a 5-percent share of Federal R&D expenditures in 1960 the space function grew to 36 percent in 1966. The mustering of national resources to place a man on the moon involved large expenditures that were reduced following completion of the development phase of that program, even though the goal itself was not achieved

until 1969. Space was the only function with smaller R&D expenditures in 1970, 1971, or 1972 than in 1966. Its expected share in the 1972 Federal R&D total is 20 percent.

- Health as a portion of the Federal R&D total was 4 percent in 1960, and is estimated at almost 9 percent in 1972. R&D expenditures for health are characterized by their relatively large size and their almost steady rise from 1960 to 1972.

- Commerce and transportation has shown continual, strong increases in its R&D expenditures, at rates well above the overall average, and has increased its share from 1 percent to 5 percent of the Federal R&D total. Growth on the transportation side has come from development of the SST aircraft and research and development in coast guard activities, urban mass transportation, and highway safety. However, the data presented in this report do not reflect congressional action on SST development funds for the last 3 months of fiscal year 1971 or any action on the 1972 budget. On the commerce side of this function, increased R&D work on weather prediction and control, on postal delivery systems, and on standards and measurements represent expansion of traditional R&D support areas.

- Education and manpower expenditures for research and development rose almost nine times in the 1960–72 period and their share of the Federal R&D total increased from 1 percent to 4 percent with greatest dollar gains made after 1965. Growth reflected recognition that a more scientific approach might improve educational methods as well as recognition of the importance of Federal support of basic research.

- Natural resources shows a higher growth rate for R&D expenditures after 1966 than is shown for the overall Federal R&D growth rate. Problems in water management, especially, have led to increased R&D funding. Nonetheless the natural resources share in the Federal R&D total is only 2 percent in the current (1970–72) period, compared with 1 percent in 1960–69.[1]

[1] R&D expenditures for natural resources could more than double if part of the non-defense-oriented portion of atomic energy R&D programs were classified in this category. However, all atomic energy outlays are included under national defense in the OMB classification system.

Approximately one-half of the atomic energy R&D expenditures are considered to be primarily non-defense-oriented—approximately $625 million estimated for 1972. Most of these expenditures could be considered as part of the natural resources function (reactor development programs), although portions could also come under health (biomedical research) and education and manpower (physical research).

While these non-defense-oriented R&D expenditures represent a relatively small amount of the national defense R&D total, approximately 7 percent in 1972, their inclusion in the three other functions could have a noticeable effect on the respective R&D totals of these functions.

TRE
R

(Percent)

Fiscal Year 1960 1961

Natural resources	1.0	0.9
Agriculture and rural development	1.4	1.4
Community development and housing	—	(a)
Income security	.1	.1
Veterans benefits and services	.2	.3
International affairs and finance	(a)	(a)
General government	(a)	(a)

(a) Less than 0.05 percent.

SOURCES: Office of Managemer

n with smaller R&D expenditures in
expected share in the 1972 Federal

total was 4 percent in 1960, and is
2. R&D expenditures for health are
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expenditures are considered to be primarily
nated for 1972. Most of these expenditures
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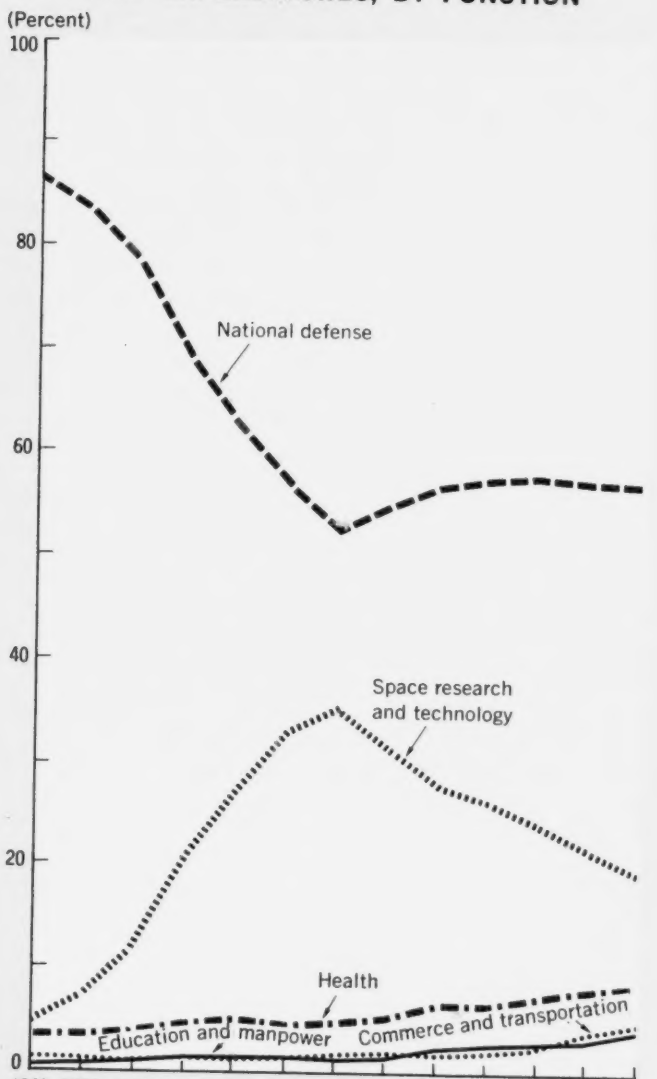
dical research) and education and manpower

represent a relatively small amount of the
in 1972, their inclusion in the three other
ve R&D totals of these functions.

TRENDS IN DISTRIBUTION OF FEDERAL R&D EXPENDITURES, BY FUNCTION



Fiscal Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 (est.)
Natural resources	1.0	0.9	1.0	1.0	0.8	1.0	1.0	1.1	1.2	1.4	1.6	1.7	1.8
Agriculture and rural development	1.4	1.4	1.3	1.2	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.7	1.7
Community development and housing	—	(a)	(a)	(a)	(a)	(a)	.3	.3	.3	.6	.6	.9	.9
Income security	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.3	.4	.5
Veterans benefits and services	.2	.3	.3	.3	.2	.3	.3	.3	.3	.3	.4	.4	.4
International affairs and finance	(a)	(a)	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2
General government	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	.1	.1

(a) Less than 0.05 percent.

SOURCES: Office of Management and Budget; National Science Foundation

- Although agriculture and rural development has shown slower R&D growth than most of the other functional areas, it has increased its R&D expenditures two and one-half times from 1960 to 1972. Federal R&D support to agriculture reflects the continuation of a long-term investment but has remained between 1 percent and 2 percent of the Federal R&D total.

- Community development and housing encompassed no formal R&D programs until 1962, and only in 1966 and thereafter did research and development show a real growth trend. In the 1966–70 period the growth rate was one of the highest among functions, and in 1971 this function shows the second highest rate of growth. However, in the 1970–72 period the community development and housing share of Federal R&D expenditures is still somewhat less than 1 percent. R&D programs are largely connected with problems of poverty and problems of urban living.

- Four functions—income security, veterans benefits and services, international affairs and finance, and general government—together are expected to make up 1 percent of all Federal R&D expenditures in 1972. In 1960 these four functions made up less than one-half of 1 percent.

Federal R&D exp
Average annual percen

Functions
Total
National defense
Space research and technology
Health
Commerce and transportation
Education and manpower
Natural resources
Agriculture and rural development
Community development and housing
Income security
Veterans benefits and services
International affairs and finance
General government

[1] Listed in descending order of 1972 R&D expe
[2] Less than 0.05 percent.

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t has increased its R&D expendi-
to 1972. Federal R&D support to
a long-term investment but has
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ncompassed no formal R&D pro-
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Federal R&D expenditures is still
grams are largely connected with
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ns benefits and services, interna-
vernment—together are expected
D expenditures in 1972. In 1960
-half of 1 percent.

Federal R&D expenditures by function: [1]
Average annual percent change in selected periods

Functions	1960–66	1966–70	1970–71	1971–72
Total	12.7	0.3	1.4	2.2
National defense	3.8	2.7	.9	1.5
Space research and technology	57.8	−8.8	−10.2	−6.3
Health	18.1	10.3	11.6	7.9
Commerce and transportation	19.0	14.2	46.6	26.5
Education and manpower	22.0	16.5	16.2	25.3
Natural resources	12.7	12.9	8.8	4.4
Agriculture and rural development	11.0	5.0	7.5	1.9
Community development and housing	—	14.9	59.5	[2]
Income security	31.0	6.3	21.5	17.2
Veterans benefits and services	17.5	10.9	5.5	1.1
International affairs and finance	40.0	15.8	14.0	[2]
General government	4.6	43.0	133.3	39.3

[1] Listed in descending order of 1972 R&D expenditures.
[2] Less than 0.05 percent.

Growth rate comparisons by function	1960–66 [1]	1966–70	1970–7
Above R&D total:	Space research and technology	National defense	
	Health	Health	Health
	Commerce and transportation	Commerce and transportation	Commerce and trans
	Education and manpower	Education and manpower	Education and manp
		Natural resources	Natural resources
		Agriculture and rural development	Agriculture and rural
		Community devel. and housing	Community devel. an
	Veterans benefits and services	Veterans benefits and services	Veterans benefits and
	Income security	Income security	Income security
	International affairs and finance	International affairs and finance	International affairs a
		General government	General government
Below R&D total:	National defense		National defense
		Space research and technology	Space research and t
	Agriculture and rural development		
	General government		
Same as R&D total:	Natural resources		

[1] Community development and housing had no formal R&D programs until 1962.

1960–66 [1]	1966–70	1970–71	1971–72
	National defense		
ace research and technology			
alth	Health	Health	Health
mmerce and transportation	Commerce and transportation	Commerce and transportation	Commerce and transportation
ucation and manpower	Education and manpower	Education and manpower	Education and manpower
	Natural resources	Natural resources	Natural resources
	Agriculture and rural development	Agriculture and rural development	
	Community devel. and housing	Community devel. and housing	
erans benefits and services	Veterans benefits and services	Veterans benefits and services	
ome security	Income security	Income security	Income security
ernational affairs and finance	International affairs and finance	International affairs and finance	
	General government	General government	General government
ional defense		National defense	National defense
	Space research and technology	Space research and technology	Space research and technology
iculture and rural development			Agriculture and rural development
neral government			
			International affairs and finance
			Community devel. and housing
			Veterans benefits and services
ural resources			

D programs until 1962.

FEDERAL R&D EXPENDITURES AS A PORTION OF TOTAL FEDERAL OUTLAYS, BY FUNCTION

- The Federal Government allocated 8.5 percent of the budget to R&D activities in 1960 and 12.4 percent in 1965, the high point. (See facing table.) Each year since then the R&D ratio has dropped, and it is expected to be 7.4 percent in 1972. Relative to other types of Federal effort, R&D activities have reflected a significant reduction in emphasis since the mid-1960's.

- Not surprisingly, the allocation of R&D effort by functional area varies widely because of the unequal applicability of research and development to different areas. Nonetheless, by expressing R&D expenditures as a percent of total outlays, function by function, insights can be gained into the extent to which Federal R&D programs are contributing to national goals and priorities.

- Space research and technology is unique in that, by definition, all of its activities are either conduct of research and development or construction of R&D facilities. Thus, the ratio of R&D expenditures to total space outlays is high and has been increasing as construction of facilities has decreased. In the current (1970–72) period it is 99 percent.

- National defense is anot
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Nam war outlays have c
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- Health reflects R&D expe
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- For commerce and transpo
percent in 1960 to an estim

- Education and manpower
ratio to rise—from the lo
percent in 1972.

- Natural resources is the o
1972 is expected to be mo
shown considerable fluctu
cent. But when the ratio i
exclude deductions for of
and 7 percent. (See footn

- Agriculture and rural devel
ratio in 1972 between 4 p
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- Community development a
in recent years. Since 196
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veterans benefits and servi
the ratio of R&D expenditu
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AS A PORTION OF
Y FUNCTION

- National defense is another function whose operations are intimately bound up with advances in equipment and systems, in this case specifically related to a broad range of weaponry. The ratio of R&D expenditures to overall defense outlays is an estimated 12 percent in 1972—higher than for any other function except space. Recently, pressures resulting from Viet Nam war outlays have caused a curtailment in defense R&D programs relative to other defense programs. Hence the present R&D ratio reflects a decline from the 1964 high point of 16 percent.

- Health reflects R&D expenditures at 8 percent of total outlays for 1972, compared with 30 percent in 1966. Even though R&D dollars have increased considerably between those years, the costs of Medicare and Medicaid have grown even faster, greatly enlarging the health function through outlays for health services.

- For commerce and transportation the R&D share is growing rapidly, from 2 percent in 1960 to an estimated 7 percent in 1972.

- Education and manpower has shown a tendency for its R&D expenditures ratio to rise—from the low point of 5 percent in 1966 to an estimated 7 percent in 1972.

- Natural resources is the only other function whose ratio of R&D work in 1972 is expected to be more than 5 percent of its total outlays. This ratio has shown considerable fluctuation in the 1960–72 period—from 5 to 12 percent. But when the ratio is calculated on the basis of gross outlays, which exclude deductions for offsetting receipts, the ratio is between 4 percent and 7 percent. (See footnote [1] in table, page 11.)

- Agriculture and rural development is expected to have an R&D expenditure ratio in 1972 between 4 percent and 5 percent. In the second half of the 1960's this ratio for this function tended to rise somewhat, fluctuating between 3 percent and 5 percent, compared with an earlier range of 2 percent to 4 percent.

- Community development and housing has also reflected a higher R&D ratio in recent years. Since 1969 this ratio has ranged between 3 percent and 5 percent, and in 1972 it is expected to be just over 3 percent. The ratio was less than 2 percent for all years prior to 1969.

- For each of the remaining four functions—international affairs and finance, veterans benefits and services, general government, and income security—the ratio of R&D expenditures to total outlays is less than 1 percent for the entire 1960–72 timespan. However, the ratios for all functions except income security have shown a slight tendency to rise.

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that, by definition, all of its
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enditures to total space outlays
ion of facilities has decreased.

Federal R&D expenditures for each function as a percent of total Federal outlays for each function,

	1960	1961	1962	1963	1964	1965	1966	1967
Total	8.5	9.5	9.7	10.8	12.3	12.4	11.8	10.7
Space research and technology	86.4	86.8	90.9	91.2	89.5	89.6	90.4	94.7
National defense	13.8	15.5	15.2	15.1	16.2	15.9	13.9	12.6
Health	36.7	36.8	39.3	40.0	40.6	35.9	29.6	13.1
Education and manpower	6.2	7.0	7.9	8.8	10.3	8.0	5.4	5.5
Commerce and transportation	1.8	2.0	2.0	2.4	2.2	2.5	3.4	4.5
Natural resources [1]	7.4	5.3	5.8	7.8	6.0	6.7	7.5	9.5
Agriculture and rural development	3.2	3.7	3.1	2.7	2.9	3.5	5.3	4.9
Community development and housing	—	(2)	.1	(3)	(3)	1.6	1.9	1.6
International affairs and finance	.1	.1	.1	.2	.2	.4	.4	.4
Veterans benefits and services	.3	.4	.5	.5	.6	.6	.6	.6
General government	.1	(2)	(3)	(3)	(3)	(3)	.1	.1
Income security	(2)	(2)	.1	.1	.1	.1	.1	.1

[1] The ratios in the table are based on total outlays (gross outlays minus offsetting receipts) as given in the **1972 Budget**. However, there are relatively the lease of mineral lands, disposal of public lands, and sales of power and timber). Therefore, the ratio of R&D expenditures to gross outlays (excluding trend, 1960–72, as follows: 4.2; 4.0; 4.4; 4.8; 4.5; 5.0; 5.0; 5.4; 5.8; 6.4; 6.8; 5.6; 5.0.

[2] Less than 0.05 percent

[3] Not calculable because of minus total outlays.

Sources: National Science Foundation; Office of Management and Budget.

expenditures for each function as a percent of total Federal outlays for each function, fiscal years 1960–72

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971 (est.)	1972 (est.)
8.5	9.5	9.7	10.8	12.3	12.4	11.8	10.7	9.6	9.0	8.2	7.7	7.4
5.4	86.8	90.9	91.2	89.5	89.6	90.4	94.7	97.4	98.6	98.7	98.5	98.7
3.8	15.5	15.2	15.1	16.2	15.9	13.9	12.6	11.6	11.2	10.9	11.6	11.6
5.7	36.8	39.3	40.0	40.6	35.9	29.6	13.1	11.2	8.9	8.6	8.4	8.4
5.2	7.0	7.9	8.8	10.3	8.0	5.4	5.5	5.7	6.2	5.9	6.0	7.1
.8	2.0	2.0	2.4	2.2	2.5	3.4	4.5	4.1	4.2	4.4	5.3	7.0
7.4	5.3	5.8	7.8	6.0	6.7	7.5	9.5	12.0	10.6	9.9	10.2	6.5
3.2	3.7	3.1	2.7	2.9	3.5	5.3	4.9	3.8	3.7	3.9	4.9	4.5
—	(3)	.1	(3)	(3)	1.6	1.9	1.6	1.2	4.5	3.0	3.7	3.2
.1	.1	.1	.2	.2	.4	.4	.4	.4	.5	.8	.9	.8
.3	.4	.5	.5	.6	.6	.6	.6	.6	.7	.7	.6	.6
.1	(3)	(3)	(3)	(3)	(3)	.1	.1	.1	.3	.2	.4	.5
	(3)	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1

s outlays minus offsetting receipts) as given in the **1972 Budget.** However, there are relatively large offsetting receipts in the natural resources area (from d sales of power and timber). Therefore, the ratio of R&D expenditures to **gross** outlays (excluding receipts) would show a lower level but a generally upward . 5.4; 5.8; 6.4; 6.8; 5.6; 5.0.

agement and Budget.

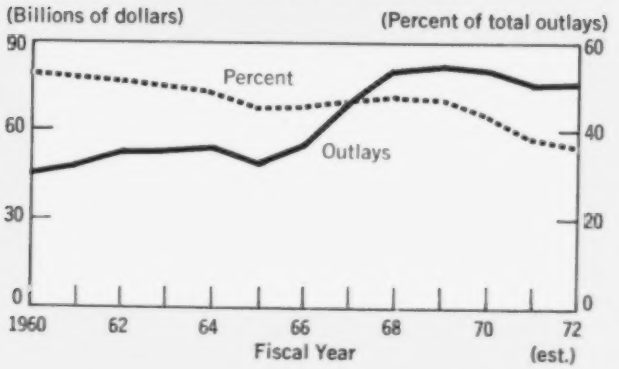
Part II

FUNCTIONS IN DETAIL*

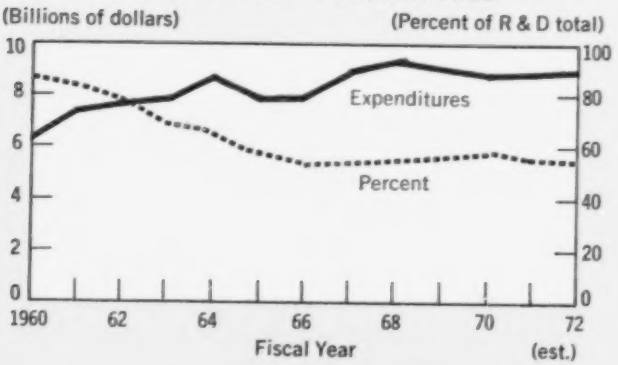
* Sections on functions are presented in order of total outlays in the 1972 budget.

NATIONAL DEFENSE

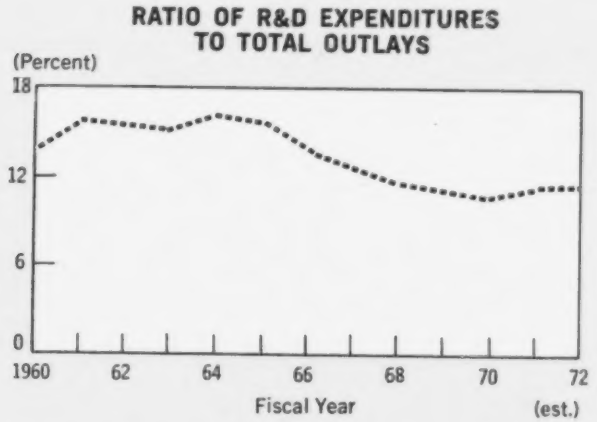
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

NATIONAL DEFE

A comparison of chang
tional defense is shown as

Total Federal outlays	
Federal R&D expenditures	

- National defense is by fa
outlays and R&D expend
defense in 1972 are exp
Federal budget—37 perc

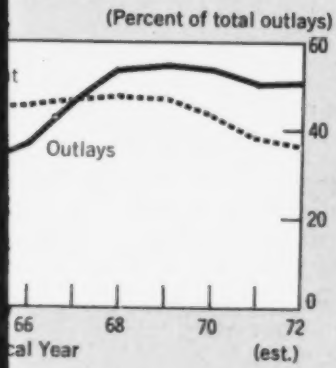
- Even when sharp fundin
related to the war in So
above 46 percent, still we

- Total Federal outlays and
at about the same rate
1966 to 1970, total outl
expenditures.

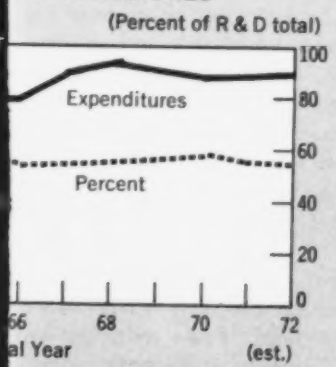
- The ratio of R&D expend
for this function has grad
to 11 percent in 1970. A
for 1972.

AL DEFENSE

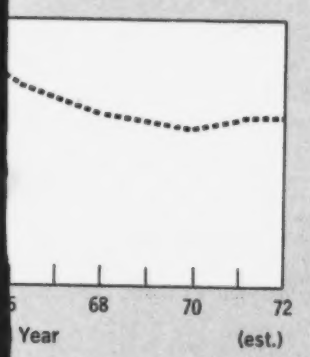
ERAL OUTLAYS



D EXPENDITURES



EXPENDITURES
L OUTLAYS



Budget; National Science Foundation

NATIONAL DEFENSE

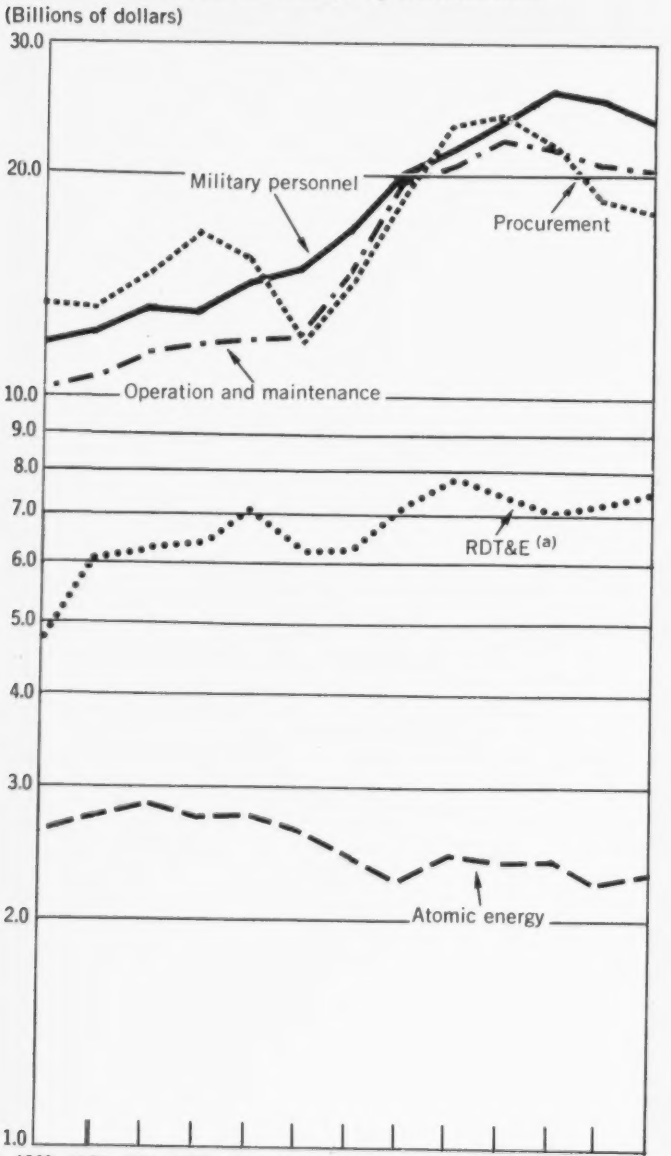
A comparison of changes in total outlays and R&D expenditures for national defense is shown as follows:

	Average annual percent change			
	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	3.6	9.0	−4.8	1.4
Federal R&D expenditures	3.8	2.7	.9	1.5

- National defense is by far the largest function in terms of both total Federal outlays and R&D expenditures. However, total Federal outlays for national defense in 1972 are expected to account for a smaller proportion of the Federal budget—37 percent—than in any year during the 1960–72 period.
- Even when sharp funding increases were occurring between 1965 and 1968 related to the war in Southeast Asia, the national defense share never rose above 46 percent, still well below the 53 percent of 1960.
- Total Federal outlays and R&D expenditures for national defense both grew at about the same rate during the 1960–66 period. However, in the years 1966 to 1970, total outlays show a much higher growth rate than R&D expenditures.
- The ratio of R&D expenditures for national defense to total Federal outlays for this function has gradually decreased from a high of 16 percent in 1964 to 11 percent in 1970. A slight increase to almost 12 percent is estimated for 1972.

NATIONAL DEFENSE

Total Federal outlays by subfunctions



Fiscal Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971 (est.)	1972
Military assistance	1.6	1.4	1.3	1.4	1.2	1.1	1.0	0.9	0.7	0.8	0.7	1.1	1.1
Defense-related activities	0.2	0.1	0.1	(b)	0.2	0.1	−0.1	(b)	0.1	0.3	0.1	−0.1	0.1

(a) Research, development, test, and evaluation.
(b) Less than $50 million.

SOURCE: Office of Management and Budget

Total Outlays

National defense outl

- Military personne
- Operation and m
- Procurement—D
- Research, develo
- Military construc
- Allowances[1]—DO
- Military assistanc
- Atomic energy[2]
- Defense–related

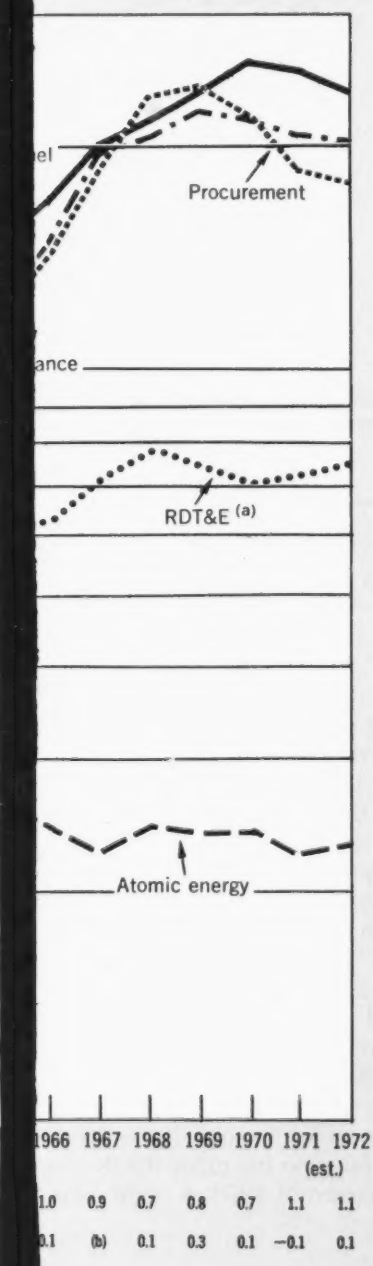
- The largest relative in tional defense functio percent to 30 percent, to 26 percent. Military to a high point of 13 in 1972. On the other of total national defe percent to 23 percent.

- Outlays for atomic e terms between 1960 a the procurement of r percent of outlays fo with the fulfillment of gradual decline in the decreasing requiremer tary uses.

- Outlays for military as billion in 1960 to an es However, the 1972 figu

[1] For all-volunteer force and c
[2] In accordance with the OMB falls under the atomic energy s half of such outlays are conside in the 1972 estimate. Most of th tion, but portions could also be

DEFENSE
s by subfunctions



Total Outlays

National defense outlays are divided among the following subfunctions:

- Military personnel—DOD-military (incl. retired military personnel)
- Operation and maintenance—DOD-military
- Procurement—DOD-military
- Research, development, test and evaluation (RDT&E)—DOD-military
- Military construction and other—DOD-military
- Allowances[1]—DOD-military
- Military assistance
- Atomic energy[2]
- Defense-related activities

- The largest relative increases over the 1960–72 period within the total national defense function have been in outlays for military personnel, from 26 percent to 30 percent, and for operation and maintenance, from 22 percent to 26 percent. Military RDT&E accounted for 10 percent in 1960, increased to a high point of 13 percent in 1964, and back to an estimated 10 percent in 1972. On the other hand, outlays for military procurement as a percent of total national defense outlays, decreased during this period, from 29 percent to 23 percent.

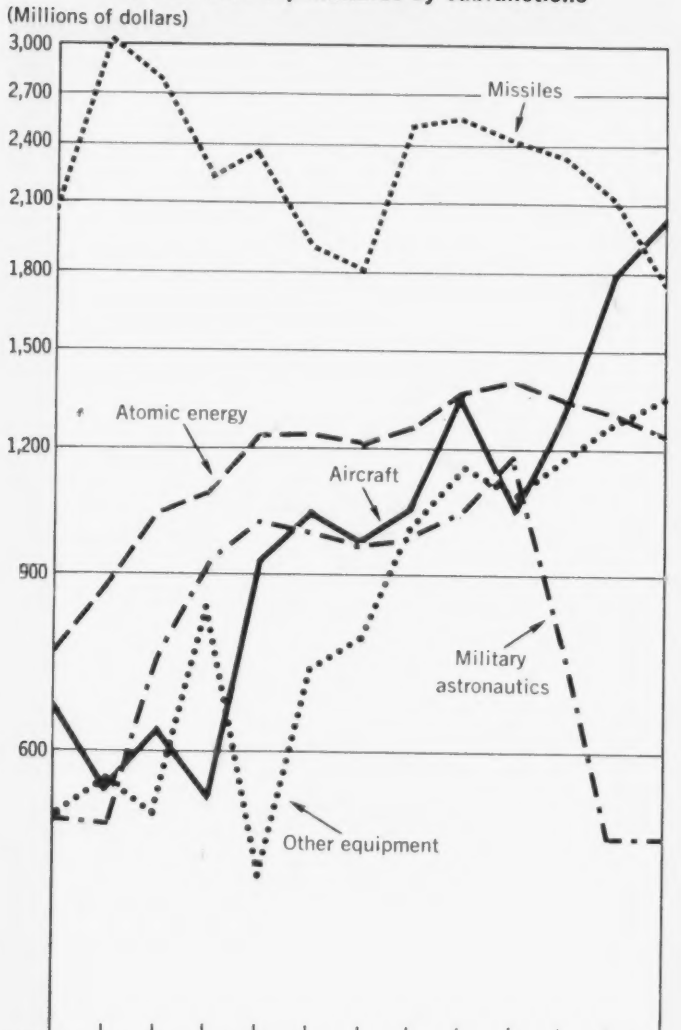
- Outlays for atomic energy have decreased in both absolute and relative terms between 1960 and 1972. This trend is primarily due to the fact that the procurement of raw materials—at its peak in 1960 accounting for 23 percent of outlays for atomic energy purposes—was terminated in 1971 with the fulfillment of existing contracts. At the same time there has been a gradual decline in the production of special nuclear materials as a result of decreasing requirements for plutonium and other reactor products for military uses.

- Outlays for military assistance also show an absolute decrease—from $1.6 billion in 1960 to an estimated $1.0 billion in 1972—and a relative decrease. However, the 1972 figure represents a substantial increase from 1970.

[1] For all-volunteer force and civilian and military pay increases for DOD.
[2] In accordance with the OMB classification system the entire Atomic Energy Commission program falls under the atomic energy subfunction within national defense even though approximately one-half of such outlays are considered by AEC to be primarily non-defense-oriented—about $1.2 billion in the 1972 estimate. Most of these outlays could be considered part of the natural resources function, but portions could also be placed under health and education and manpower.

NATIONAL DEFENSE

Federal R&D expenditures by subfunctions



Fiscal Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 (est.)
Programwide management support	256	551	637	531	585	542	504	426	339	458	413	498	498
Military sciences	362	507	616	838	878	573	619	610	521	571	501	496	486
Ships	154	209	190	219	264	249	283	296	261	329	362	330	465
Ordnance	222	212	227	208	280	330	361	343	324	336	381	327	340
Other DOD military	842	369	399	415	408	387	416	439	340	304	369	356	322
Emergency fund	—	—	—	—	—	—	—	—	—	—	—	15	45
Defense-related activities	5	1	1	1	(a)	(a)	1	1	1	1	1	1	1
Military assistance	—	—	—	—	—	—	—	—	—	—	—	—	—

(a) Less than $500 thousand.

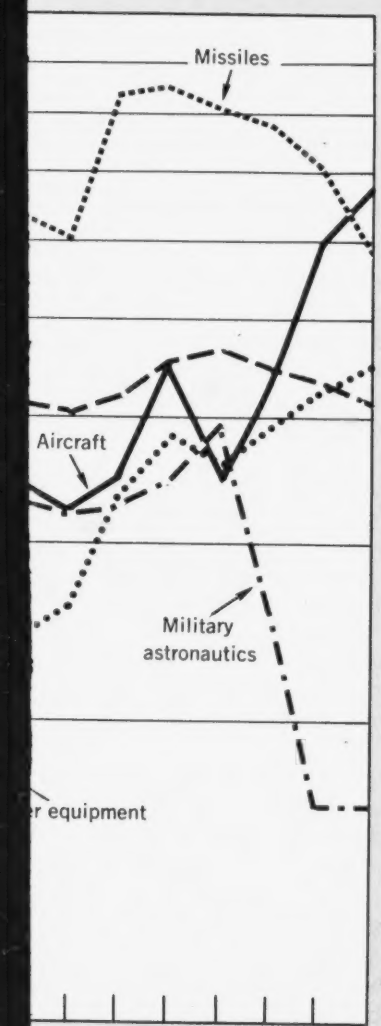
SOURCES: Office of Management and Budget; National Science Foundation

Research and Dev

- R&D expenditures for D RDT&E appropriation exc than $100 million in 197 support from other appro of military personnel worki
- RDT&E funds are divide treated as individual sub Since national defense rep expenditures, this more d the 1972 Budget is used.
- Development of a new we tion of testing and introdu more years. As the defin moves into full-scale devel but as this phase nears con tures for some of these ac nautics, show an erratic p over a given period.

AL DEFENSE

ditures by subfunctions



1966	1967	1968	1969	1970	1971 (est.)	1972
504	426	339	458	413	498	498
619	610	521	571	501	496	486
283	296	261	329	362	330	465
361	343	324	336	381	327	340
416	439	340	304	369	356	322
—	—	—	—	—	15	45
1	1	1	1	1	1	1
—	—	—	—	—	—	—

ience Foundation

Research and Development

- R&D expenditures for DOD-military include all expenditures from the RDT&E appropriation except for small amounts used for R&D plant—less than $100 million in 1970, 1971 and 1972—and minor amounts of R&D support from other appropriations, primarily covering pay and allowances of military personnel working in research and development.

- RDT&E funds are divided by program areas which, in this report, are treated as individual subfunctions under the national defense function. Since national defense represents such a large portion of total Federal R&D expenditures, this more detailed breakout than the subfunctions listed in the 1972 Budget is used.

- Development of a new weapons system from initial definition to completion of testing and introduction into the operating forces may require 5 or more years. As the definition phase is completed and the new system moves into full-scale development, sharp increases in funding are required, but as this phase nears completion, funding falls off sharply. Thus, expenditures for some of these activities, particularly missiles, aircraft, and astronautics, show an erratic pattern with many sharp increases and decreases over a given period.

Distribution of Federal R&D expenditures for national defense, by subfunction

	1960	1966	1970	1971	1972
	(Dollars in millions)				
National defense, total	$6,317.8	$7,887.9	$8,783.7	$8,860.9	$8,998.1
	Percent distribution				
Aircraft and related equipment (DOD–RDT&E)	10.0	12.4	14.1	19.3	21.9
Missiles and related equipment (DOD–RDT&E)	32.6	22.8	25.8	23.9	19.9
Other equipment (DOD–RDT&E)	8.1	10.0	13.1	13.8	14.9
Atomic energy [1]	12.1	15.4	15.3	14.7	13.9
Programwide management and support (DOD–RDT&E)	4.1	6.4	4.7	5.6	5.5
Military astronautics and related equipment (DOD–RDT&E)	8.1	11.8	8.6	5.5	5.4
Military sciences (DOD–RDT&E)	5.7	7.8	5.7	5.6	5.4
Ships, small craft and related equipment (DOD–RDT&E)	2.4	3.6	4.1	3.7	5.2
Ordnance, combat vehicles and related equipment (DOD–RDT&E)	3.5	4.6	4.3	3.7	3.8
Other DOD	13.3	5.3	4.2	4.0	3.6
Emergency fund (DOD–RDT&E)	—	—	—	.2	.5
Defense-related activities	.1	(2)	(2)	(2)	(2)

[1] In accordance with the OMB classification system the entire Atomic Energy Commission program falls under the atomic energy subfunction of national defense. However, approximately one-half of AEC's R&D expenditures, $625 million in the 1972 estimate, are considered to be non-defense-oriented. Most of these funds could logically fall under the natural resources function, but portions could also be placed under health and education and manpower.

[2] Less than 0.05 percent.

AIRCRAFT AND RELATED EQ

- R&D expenditures for aircra crease throughout the 1960- of the national defense R& estimated 22 percent. In 19 the aircraft subfunction is e defense. Substantial increase current budget period (1970-

- These increases primarily a systems as the Navy F–14A F–14B growth version; the craft; the Air Force F–15 a tegic bomber; and the F–5 in

- Systems that will commence heavy lift helicopter; the Air destroyer helicopter system;

- R&D programs with heavy nearing completion in 197 and the C–5A logistic trans aircraft.

- Systems which were heavily the Air Force 1F and 2A bomber; the Army Cheyenn fire-support helicopter.

MISSILES AND RELATED EQU

- This subfunction has not or defense R&D expenditures, but since 1968 R&D expend $1.8 billion in 1972—the low

defense, by subfunction

	1970	1971	1972
s in millions)			
	$8,783.7	$8,860.9	$8,998.1
t distribution			
	14.1	19.3	21.9
	25.8	23.9	19.9
	13.1	13.8	14.9
	15.3	14.7	13.9
	4.7	5.6	5.5
	8.6	5.5	5.4
	5.7	5.6	5.4
	4.1	3.7	5.2
	4.3	3.7	3.8
	4.2	4.0	3.6
	—	.2	.5
	(²)	(²)	(²)

omic Energy Commission program owever, approximately one-half of sidered to be non-defense-oriented. function, but portions could also

AIRCRAFT AND RELATED EQUIPMENT

- R&D expenditures for aircraft and related equipment show the largest increase throughout the 1960–72 period of any subfunction in terms of share of the national defense R&D total. They moved from 10 percent to an estimated 22 percent. In 1972 for the first time in the period under study the aircraft subfunction is expected to be the largest one within national defense. Substantial increases in aircraft R&D programs are expected in the current budget period (1970–72).

- These increases primarily are due to the full-scale development of such systems as the Navy F–14A fleet air defense fighter/interceptor and its F–14B growth version; the S–3A antisubmarine warfare carrier-based aircraft; the Air Force F–15 air superiority fighter; the B–1 advanced strategic bomber; and the F–5 international fighter.

- Systems that will commence development in 1972 include the joint service heavy lift helicopter; the Air Force A-X close air support aircraft, the LAMPS destroyer helicopter system; and the Army VTTAS logistics helicopter.

- R&D programs with heavy funding in the second half of the 1960's and nearing completion in 1972 include the Air Force F–111 tactical fighter and the C–5A logistic transport, and the Navy EA–6B electronic warfare aircraft.

- Systems which were heavily funded and completed in the 1960's include the Air Force 1F and 2A long-range interceptors, the XB–70 Mach-3 bomber; the Army Cheyenne Armed helicopter, and the advanced aerial fire-support helicopter.

MISSILES AND RELATED EQUIPMENT

- This subfunction has not only decreased in terms of its share of national defense R&D expenditures, from 33 percent in 1960 to 20 percent in 1972, but since 1968 R&D expenditures have decreased steadily to an estimated $1.8 billion in 1972—the lowest level for the entire 1960–72 period.

- The declining trend is primarily due to near completion of several major systems such as the Minuteman (Air Force) and Poseidon (Navy) ballistic missile systems; the Navy Condor and Air Force Maverick air-to-surface missile systems; the Navy Phoenix air-to-air missile; the Air Force strategic short-range attack missile (SRAM); and the Army SAM surface-to-air missile. These systems were heavily funded in the 1960's.

- However, increases are planned in 1972 for the undersea long-range missile system (ULMS), the Navy Harpoon antiship missile and Agile air-to-air dog-fight missile, and the Army terminal homing guidance technology.

- Under continuing major development in the current period is the Aegis fleet defense missile system and the Army SAM-D missile system for air defense. The Safeguard antiballistic missile system, as well as other antiballistic missile system concepts, will be pursued to maintain the sufficiency of our strategic forces.

- Other missile programs that were heavily funded in the 1960's include the Army Mauler tactical surface-to-air missile, the Nike-Zeus anti-missile missile, the Pershing intermediate-range ballistic missile; the Air Force Atlas intercontinental ballistic missile, the Skybolt air-launched ballistic missile; and the Navy Typhon fleet air defense missile.

OTHER EQUIPMENT

- Expenditures for research and development on equipment not separately provided for under other DOD-RDT&E activities have steadily increased in absolute and relative terms since 1964.

- Emphasized in 1972 are the Airborne Warning and Control System (AWACS), electronic warfare countermeasures, tactical sensor systems for battlefield surveillance, and undersea surveillance systems.

ATOMIC ENERGY

- The atomic energy subfunction (the entire R&D effort of AEC) accounts for 14 percent of the national defense R&D effort in 1972. But within total national defense outlays the atomic energy share is only 3 percent.

- Atomic energy R&D programs are research and development 33 perc physical research 21 percent; bion atomic energy programs 1 percent.

- Reductions in the current (1970–72 ground testing of nuclear weapons development program; and in the systems for space applications.

- Increases are planned in the progra fast-breeder power reactor.

MILITARY ASTRONAUTICS AND REL

- R&D expenditures for this subfunct the 1960 level.

- The increase in the early 1960's and related to work on the Air Force Dyn ities for controlled reentry, a progra heavily supported at that time was t an improved multipurpose space boo

- After 1968 sharp decreases were mai Air Force Manned Orbiting Laborator

- Major programs funded in the curr communications satellite systems ar tems.

MILITARY SCIENCES

- This subfunction reached a peak in tures—$878 million—and in terms o national defense—10 percent.

- Since 1964, military sciences expend estimated $486 million, a reduction national defense R&D total.

- Atomic energy R&D programs are divided as follows in 1972: weapons research and development 33 percent; reactor development 38 percent; physical research 21 percent; biomedical research 7 percent; and other atomic energy programs 1 percent.

- Reductions in the current (1970–72) period primarily occur in the underground testing of nuclear weapons; in the NERVA nuclear rocket engine development program; and in the development of small electric power systems for space applications.

- Increases are planned in the program to develop an economic liquid-metal fast-breeder power reactor.

MILITARY ASTRONAUTICS AND RELATED EQUIPMENT

- R&D expenditures for this subfunction in 1972 are expected to be below the 1960 level.

- The increase in the early 1960's and the sharp drop in 1964 were primarily related to work on the Air Force Dynasoar—a manned vehicle with capabilities for controlled reentry, a program that was started, then dropped. Also heavily supported at that time was the Air Force Titan squadrons program, an improved multipurpose space booster system.

- After 1968 sharp decreases were mainly the result of the cancellation of the Air Force Manned Orbiting Laboratory.

- Major programs funded in the current (1970–72) period include military communications satellite systems and ballistic missile early warning systems.

MILITARY SCIENCES

- This subfunction reached a peak in 1964, both in terms of R&D expenditures—$878 million—and in terms of share of total R&D expenditures for national defense—10 percent.

- Since 1964, military sciences expenditures have gradually decreased to an estimated $486 million, a reduction of 45 percent, and to 5 percent of the national defense R&D total.

SHIPS, SMALL CRAFT, AND RELATED EQUIPMENT

- This subfunction has shown substantial growth both in absolute and relative terms over the 1960–72 period.

- Increases for 1972 are planned for the development and testing of hydrofoil craft, surface effects ship prototypes, antisubmarine warfare sensors, shipboard tactical communications, antiship warfare sensors, antiship missile countermeasures, and computer-aided ship designs.

ORDNANCE, COMBAT VEHICLES, AND RELATED EQUIPMENT

- Programs showing increases under this subfunction in 1972 include lasers for the three services and advanced mines for both the Army and Navy. Undergoing continued development are improved gun systems for the Air Force and an "austere" version of the XM-803 main battle tank for the Army.

- Systems completing development are the MK-48 torpedo and the TOW and Dragon antitank weapons.

Summary of current r

Aircraft and related
related to developm
stalled aircraft equip
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ogy.
R&D centers funded
Base, the Naval Air D
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Missiles and related
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Other equipment: D
not separately provic
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oratories.

Aircraft and related equipment: DOD–RDT&E: Supports RDT&E efforts related to development of airframes, engines, avionics, and other installed aircraft equipment. Covers applied research in a wide variety of supporting technologies in areas such as flight dynamics, advanced aircraft propulsion systems avionics, advanced weapons, and biotechnology.

R&D centers funded include laboratories at Wright-Patterson Air Force Base, the Naval Air Development Center, Johnsville, Pa., and the Army Aviation Materials Laboratory, Fort Eustis, Va.

Missiles and related equipment: DOD–RDT&E: Includes RDT&E work on missile systems of all types. In addition to funding contracts with industry, covers a major portion of support for the operation of such facilities as the Western Test Range, the White Sands Missile Range, the Naval Weapons Center at China Lake, and the R&D programs at the Army's Redstone Arsenal.

Other equipment: DOD–RDT&E: Covers RDT&E efforts on equipment not separately provided for under other activities. Examples are ocean engineering systems and technology development; chemical and biological agent detection and protection devices; combat clothing; tactical data processing systems; communications equipment; improved logistics and materiel handling; mapping and geodetic systems; and biomedical projects.

R&D organizations funded include the Army Electronic Research and Development Laboratories, the MITRE Corporation, and the Lincoln Laboratories.

Atomic energy: AEC: Development and testing of safe and reliable nuclear weapons to meet national needs. Research effort primarily directed toward improving weapons and conducting research on new weapons with special characteristics adopted to new DOD weapons systems. Work also conducted in environmental sciences in support of nuclear weapons test operations.

Development, demonstration, improvement and safe operation of nuclear reactors and nuclear devices which may be used to generate electricity in power plants; to produce heat for process heat applications such as desalting sea water; to propel submarines or surface vessels; to propel space vehicles; to furnish thermal and electrical power for attended and unattended space, terrestrial, and undersea applications; and to provide energy for use on lunar or planetary bodies.

Theoretical and experimental investigations directed toward discovery of natural laws and new knowledge and toward improving understanding of those aspects of the **physical sciences** related to the development, use, and control of atomic energy.

Basic and applied biomedical research on the effects of radiation on living organisms and on the environment; also research related to protection against the injurious effects of radiation. Methods are developed for using radioactive materials in the diagnosis, treatment, and understanding of human diseases, such as cancer.

Development of new uses of radioisotopes and radiation, and the civilian applications of **nuclear explosives** (Plowshare).

Military astronautics and related equipment: DOD–RDT&E: R&D activities directed toward improvement of space technology for military purposes and include investigation and development of specific military applications for space vehicles. Both contractual and in-house efforts related to space technology are funded.

Military sciences: DOD–RDT&E: Supports research in the physical, mathematical, environmental, engineering, biomedical, and behavioral sciences to gain needed scientific knowledge leading to applications of military significance.
Principal support for the Naval Research Laboratory and some of the Federally Funded Research and Development Centers provided. Also, support to applied research efforts under allowable indirect costs permitted under contracts funded from RDT&E and procurement appropriations and let to industrial firms.

Programwide management and supp
Army and Navy for those costs of o
nance of research, development, a
rectly to other budget activities. Pr
costs of central administration, inc
mand headquarters and divisions an

Ships, small craft, and related e
RDT&E work on ship structures an
systems, and communications, navi
tems directly affecting ship operatio
cation, and performance evaluation
termeasure devices, marine gas turb

A significant portion of the effort at
opment Center is funded under this c

Ordnance, combat vehicles, and rela
vides for the development, test, an
guns, rocket launchers, mortars, sma
nuclear and chemical munitions, an
ons. Also includes exploration and e
explosives, detonators, dispensers, an
work at several Army arsenals and
White Oak, Md. provided.

Emergency fund: DOD–RDT&E: En
support the exploitation of new scie
cal breakthroughs and to provide fo
the RDT&E programs.

Defense-related activities: Office of
program to support OEP's responsi
preparedness and telecommunication

Programwide management and support: DOD–RDT&E: Provides for the Army and Navy for those costs of operation, management, and maintenance of research, development, and test facilities not distributed directly to other budget activities. Provides for the Air Force for certain costs of central administration, including the Air Force Systems Command headquarters and divisions and several large RDT&E centers.

Ships, small craft, and related equipment: DOD–RDT&E: Includes RDT&E work on ship structures and equipment, including propulsion systems, and communications, navigation, and ocean surveillance systems directly affecting ship operations. Includes design, prototype fabrication, and performance evaluation of new types of ships, sonars, countermeasure devices, marine gas turbines, and nuclear propulsion plants.

A significant portion of the effort at the Naval Ships Research and Development Center is funded under this category.

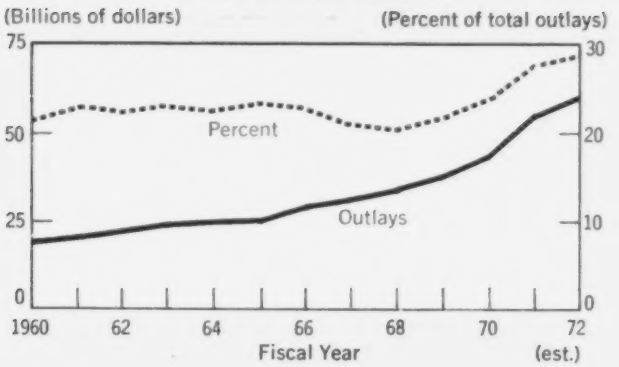
Ordnance, combat vehicles, and related equipment: DOD–RDT&E: Provides for the development, test, and evaluation of improved artillery, guns, rocket launchers, mortars, small arms, mines, grenades, torpedoes, nuclear and chemical munitions, and conventional air-launched weapons. Also includes exploration and evaluation of new fuzes, propellants, explosives, detonators, dispensers, and armor. Principal support for R&D work at several Army arsenals and the Naval Ordnance Laboratory at White Oak, Md. provided.

Emergency fund: DOD–RDT&E: Enables the Secretary of Defense to support the exploitation of new scientific developments and technological breakthroughs and to provide for other unforeseen contingences in the RDT&E programs.

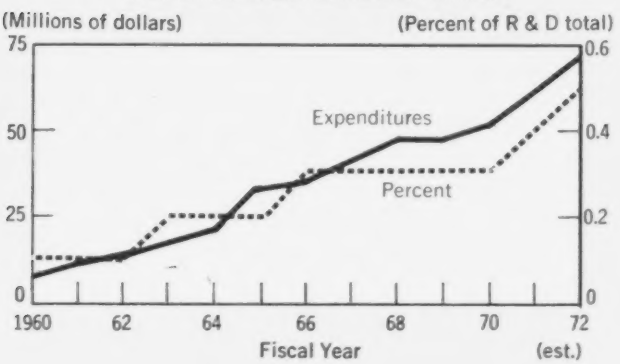
Defense-related activities: Office of Emergency Preparedness: Research program to support OEP's responsibilities in the areas of emergency preparedness and telecommunications management.

INCOME SECURITY

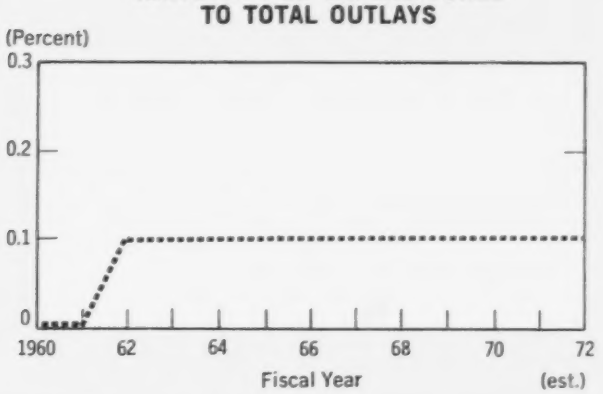
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

INCOME SEC

A comparison of
R&D programs with

Total Federal outlays
Federal R&D expenditu

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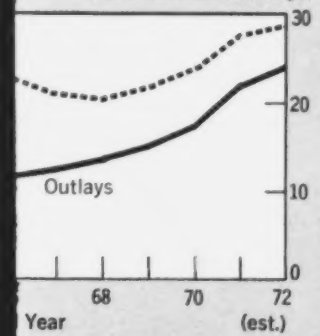
SECURITY

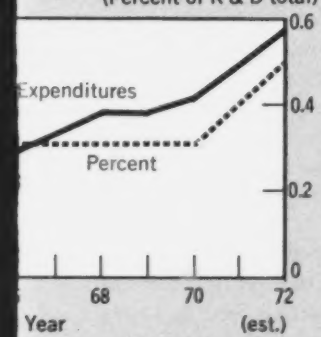
RAL OUTLAYS

(Percent of total outlays)

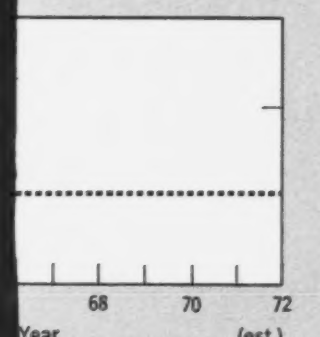


EXPENDITURES

(Percent of R & D total)



EXPENDITURES
OUTLAYS



udget; National Science Foundation

INCOME SECURITY

A comparison of growth rates for total income security outlays and the R&D programs within the income security function is shown below:

Average annual percent change

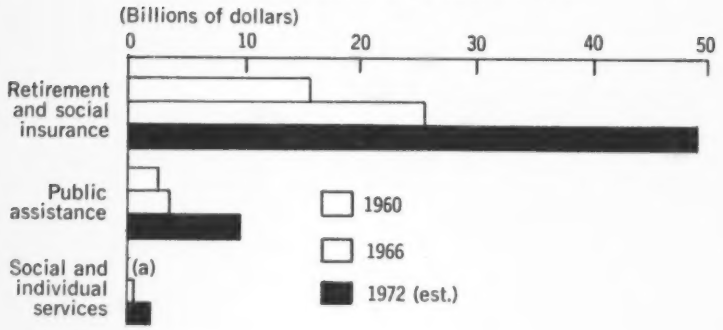
	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	8.1	10.8	26.8	9.3
Federal R&D expenditures	31.0	6.3	21.5	17.2

- Since 1960 a significant portion of each year's total Federal outlays has been devoted to income security—always 20 percent or more—and that portion has been increasing since 1968, moving from 20 to 29 percent.
- In fact, since 1968 no functional group has reflected funding increases of equal magnitude in absolute dollars. Between 1968 and 1971 income security accounted for 55 percent or more of the annual increases in total Federal outlays. In 1971–72 the comparable figure is 45 percent.
- R&D programs in the income security area have grown rapidly from very small beginnings but have never risen above one-tenth of 1 percent of the income security total.

Total Outlays

INCOME SECURITY

Total Federal outlays by subfunctions



(a) Less than $100 million.

SOURCE: Office of Management and Budget

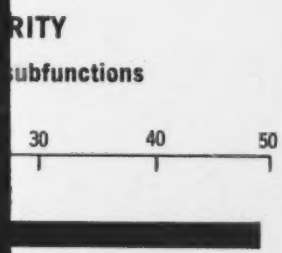
The income security function i

- Retirement and social in
- Public assistance
- Social and individual ser

- *Retirement and social insura* income security. This subfu survivors, and disability insu porarily unemployed.

- Under *public assistance* cash or no means of support: on aged, blind, or disabled. Fo groups.

- *Social and individual service* including efforts in foster car



Total Outlays

The income security function is comprised of three subfunctions:

- Retirement and social insurance
- Public assistance
- Social and individual services

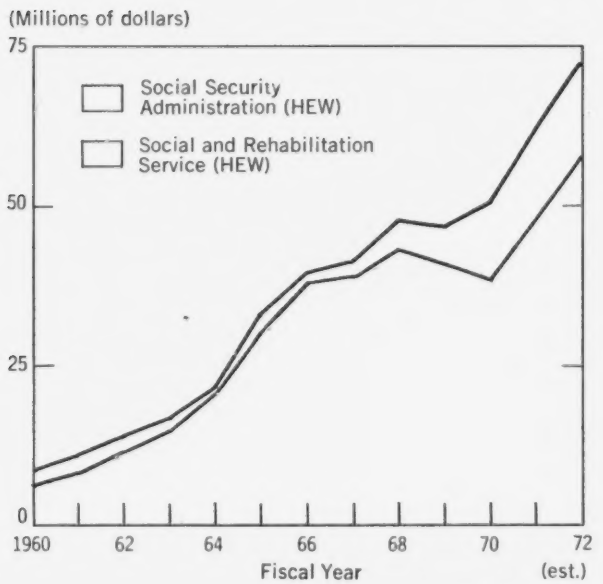
- *Retirement and social insurance* accounts for four-fifths of the outlays under income security. This subfunction is made up of payments to old-age, survivors, and disability insurance beneficiaries, also to those who are temporarily unemployed.

- Under *public assistance* cash assistance is provided to those who have little or no means of support: one-parent families with dependent children, the aged, blind, or disabled. Food stamps are also made available to these groups.

- *Social and individual services* are rendered to public assistance recipients, including efforts in foster care, adoption, and vocational rehabilitation.

Federal R&D Expenditures by Subfunctions and Agency Programs

SOCIAL AND INDIVIDUAL SERVICES



SOURCES: Office of Management and Budget; National Science Foundation

Research an

Trends in R&D

Income security, total

Social and individual s

Social and Rehabilitati (HEW) .....

Social Security Adminis (HEW) .....

Retirement and social

Public assistance ...

Comments

* Although *social* expenditures un account for only

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L SERVICES

National Science Foundation

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Income security, total	$ 7.7	$39.7	$50.7	$61.6	$72.2
	Percent distribution				
Social and individual services	100.0	100.0	100.0	100.0	100.0
Social and Rehabilitation Service (HEW)	72.7	93.5	76.0	78.9	79.8
Social Security Administration (HEW)	27.3	6.5	24.0	21.1	20.2
Retirement and social insurance	—	—	—	—	—
Public assistance	—	—	—	—	—

Comments

- Although *social and individual services* covers 100 percent of the R&D expenditures under income security, this subfunction is expected to account for only 3 percent of the total income security outlays in 1972.

  HEW Social and Rehabilitation Service R&D programs, the source of over three-fourths of such expenditures in nearly all years, show particular growth in the current budget period stemming from increased efforts to find ways to get better results with social service operating programs.

SOCIAL AND INDIVIDUAL SERVICES

Social and Rehabilitation Service: HEW: Pioneering projects devoted to developing new techniques and accumulating information in the general area of aging and its relationships to social arrangements and organization within the larger society.

Grants in child welfare support studies on the development of more effective ways of getting needed services to disadvantaged people.

Also, research to develop new techniques and knowledge to increase efficiency of services to the mentally retarded and to help in vocational rehabilitation of mentally, physically, or culturally handicapped individuals.

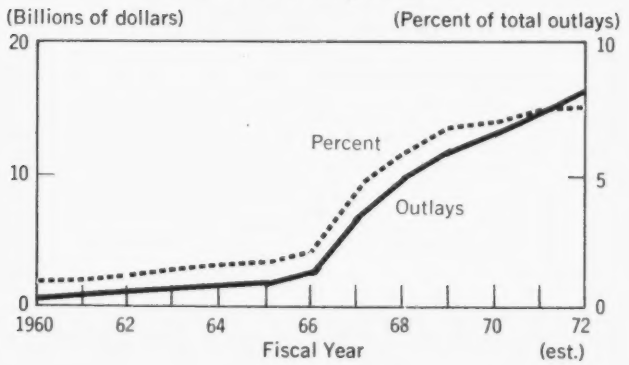
The Special Center program conducts large-scale programmatic research in conjunction with selected universities in such fields as rehabilitation medicine, mental retardation, deafness, and interdisciplinary social sciences. Additional centers planned in neurophysiology and epilepsy.

Research conducted into strengthening ongoing statistical reporting programs, including research into automation, better analysis and forecasting techniques, better reporting systems.

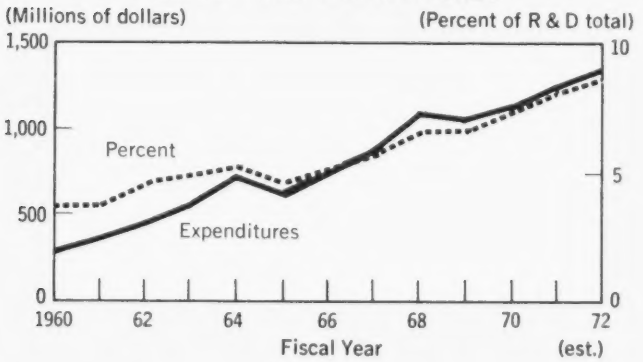
Social Security Administration: HEW: Long-range research to project and interpret changing demographic, economic, and social trends relating to overall economic and social policy. Special studies on utilization of health services. A continuing survey on the disabled population. Studies of the retirement process and of survivors of deceased workers. Comparative studies of social security programs throughout the world.

HEALTH

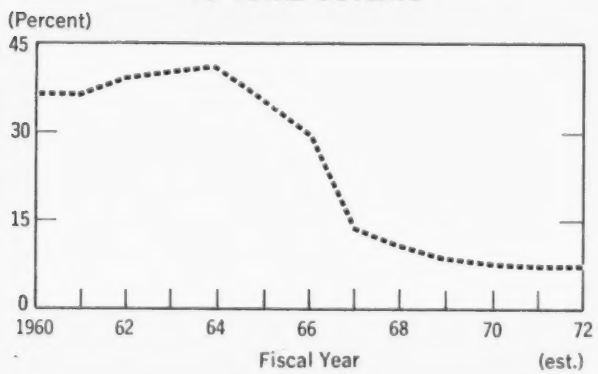
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

This function has sho
rates:

Total Federal outlays	
Federal R&D expenditure	

- Although health is
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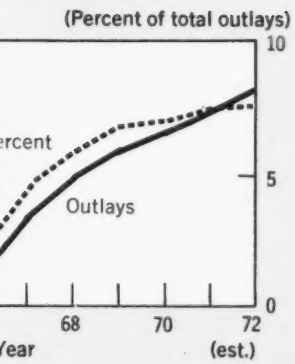

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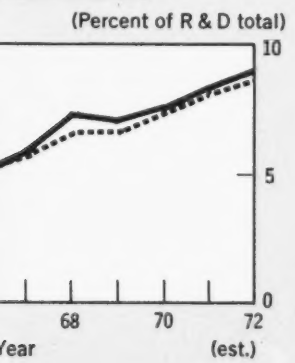

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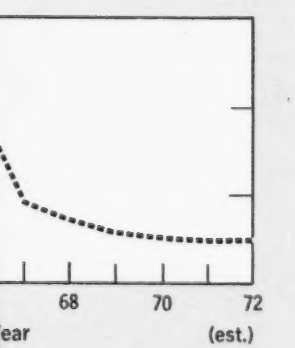


get; National Science Foundation

HEALTH

This function has shown substantial growth in all periods and at the following rates:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	22.0	50.4	14.9	7.2
Federal R&D expenditures	18.1	10.3	11.6	7.9

- Although health is the third most important function in terms of total outlays, it has been in this position only since 1968. In 1960 the health function was in 11th place.

- Between 1966 and 1970 health outlays rose at a much higher average annual growth rate than any other function. Virtually all of the increase can be traced to funding of Medicare and Medicaid programs, beginning in 1966. Although in the current period the *rate* of growth is diminished, yearly dollar increases are substantial.

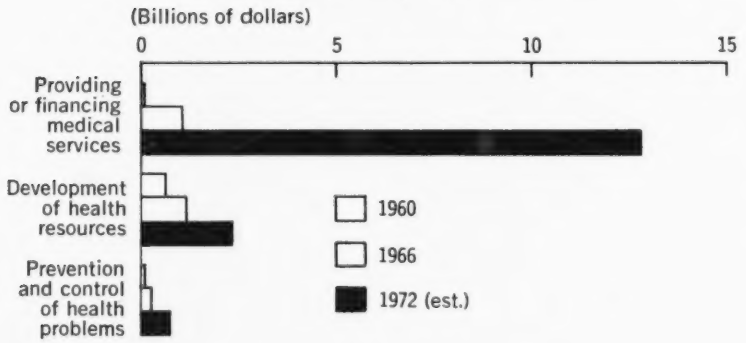
- R&D expenditures grew more rapidly in earlier years than between 1966 and 1970, but in the current (1970–72) period research and development are about keeping pace with overall health outlays.

- Actual R&D expenditures have risen significantly between 1960 and 1972, and so has their share of total Federal R&D expenditures—from 4 percent in 1960 to 9 percent in 1972. As a portion of the total health function, however, R&D expenditures have dropped dramatically—from 37 percent in 1960 to 8 percent in 1972—because of the even higher rise in total outlays.

Total Outlays

HEALTH

Total Federal outlays by subfunctions



SOURCE: Office of Management and Budget

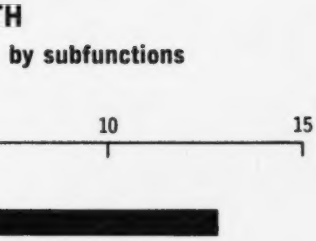
Within the health function there a

- Providing or financing med
- Development of health res
- Prevention and control of h

- The subfunction, *providing or* growth since 1966. Under me protection against medical co States. At the same time Medica ing basis to needy families. N services, Federal Employee Hea HEW medical facilities are addi tion.

- *Development of health resour* research, health manpower tra improving organization and deli

- *Prevention and control of heal* prevention and control of dise prehensive and mental health well as certain mental health act



Total Outlays

Within the health function there are three subfunctions:

- Providing or financing medical services
- Development of health resources
- Prevention and control of health problems

- The subfunction, *providing or financing medical services,* has been first in growth since 1966. Under medical services the Medicare program gives protection against medical costs for almost all the aged in the United States. At the same time Medicaid provides health services on a State-matching basis to needy families. Maternal and child health, family planning services, Federal Employee Health Benefits, and the provision of services in HEW medical facilities are additional parts of the medical services subfunction.

- *Development of health resources* includes biomedical and mental health research, health manpower training, construction of health facilities, and improving organization and delivery of health services.

- *Prevention and control of health problems* includes environmental health, prevention and control of disease, operating support of community comprehensive and mental health centers, and protection of the consumer, as well as certain mental health activities.

Research and Development

Trends in R&D Programs

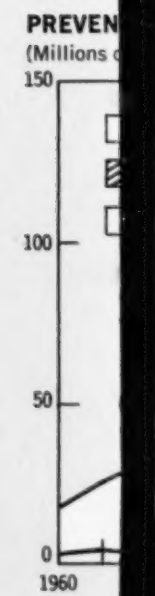
	1960	1966	1970	1971	1972
	(Dollars in millions)				
Health, total	$ 277.5	$ 753.7	$1,117.3	$1,250.2	$1,348.4
	Percent distribution				
Development of health resources	93.3	91.2	90.7	89.8	89.8
National Institutes of Health (HEW)	81.8	80.3	78.7	77.8	78.2
Health Services and Mental Health Administration (HEW) [1]	11.5	10.9	12.0	12.0	11.6
Prevention and control of health problems	6.6	8.7	8.1	9.2	9.7
Environmental Control and Air Pollution Control (EPA)	[3]5.8	[3]7.3	3.0	4.4	4.9
Health Services and Mental Health Administration (HEW) [2]			3.5	3.1	2.7
Food and Drug Administration (HEW)	.8	1.4	1.6	1.8	2.1
Providing or financing medical services	.1	.1	1.1	1.0	.5
Health Services and Mental Health Administration (HEW) [4]	.1	.1	1.1	1.0	.5

[1] Mental health, health services R&D, research in hospital construction, national health statistics, scientific activities overseas.

[2] Disease control. Data shown for HSMHA (disease control) for the current (1970-72) period includes elements of environmental health formerly under the purview of HEW's Environmental Health Services (EHS). The remainder of the EHS environment health program plus all of the air pollution program is included under EPA for the 1970-72 period.

[3] Data are lacking in sufficient detail to divide between HSMHA and EPA the R&D dollars previous to 1970 that were under EHS and its predecessors.

[4] Maternal and child health, patient care and special health services, Indian health services.



SOURCES

	1971	1972
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	9.2	9.7
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national health statistics,

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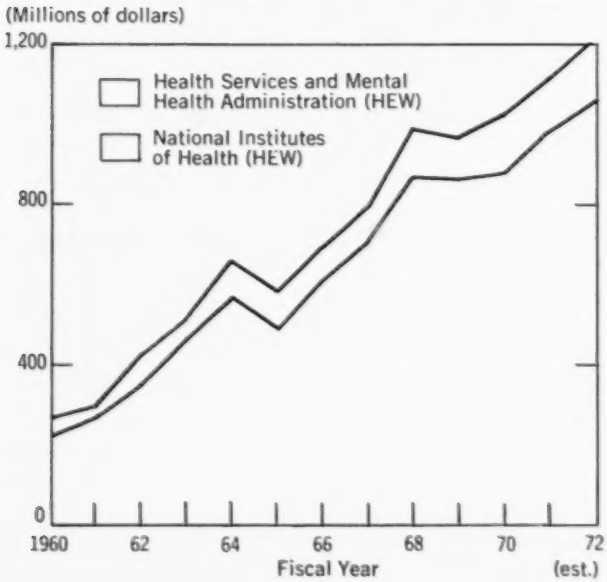
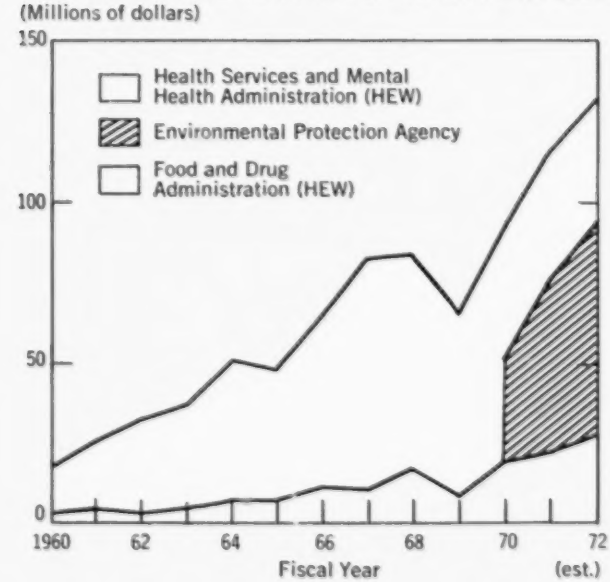
Federal R&D Expenditures by Subfunctions and Agency Programs

DEVELOPMENT OF HEALTH RESOURCES



PREVENTION AND CONTROL OF HEALTH PROBLEMS



SOURCES: Office of Management and Budget; National Science Foundation

Comments

- In terms of R&D expenditures for health, *the development of health resources* subfunction accounts for approximately 90 percent of the total.

  The National Institutes of Health, which makes up approximately 78 percent of all health R&D programs, is composed of 10 separate institutes devoted to R&D activities in specific areas of health, plus certain related subdivisions, such as health manpower and biologic standards.

  Within NIH the relative shares of the institutes in 1972 are:

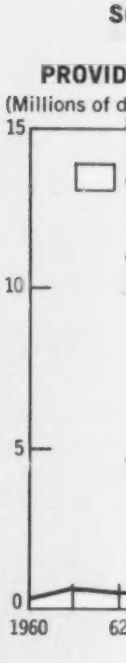
  National Cancer Institute: 20 percent
  National Heart and Lung Institute: 15 percent
  National Institute of Arthritis and Metabolic Diseases: 11 percent
  National Institute of General Medical Sciences: 8 percent
  National Institute of Allergy and Infectious Diseases: 8 percent
  National Institute of Neurological Diseases and Stroke: 8 percent
  National Institute of Child Health and Human Development: 8 percent
  National Institute of Dental Research: 3 percent
  National Institute of Environmental Health Sciences: 2 percent
  National Eye Institute: 2 percent

  The Health Services and Mental Health Administration encompasses a range of R&D interests within the development of health resources subfunction. Of these, Mental Health makes up the main share. Other HSMHA activities include health services research and development and R&D efforts connected with hospital construction, national health statistics, and overseas programs.

  Within HSMHA, R&D work in health services is responsible for the strong dollar rise in the current period.

- Second in R&D expenditures is *prevention and control of health problems.* Here are placed R&D programs designed to reduce air and water pollution and to protect the consumer against harmful drugs and food products.

  Work within this area reflects the shifts in emphasis placed on different national health problems between 1960 and 1972. Whereas R&D work on chronic and communicable diseases took the lead in 1960, now the chief activity is found in R&D efforts to control environmental health hazards.



SOURCES: Of

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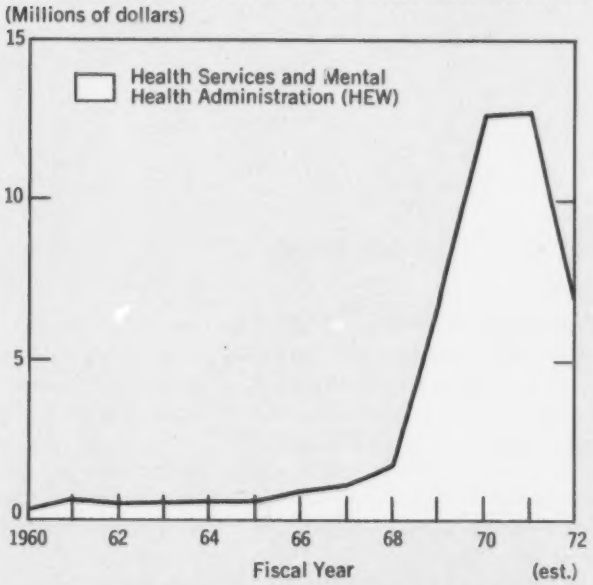
Federal R&D Expenditures by Subfunctions and Agency Programs

PROVIDING OR FINANCING MEDICAL SERVICE



SOURCES: Office of Management and Budget; National Science Foundation

- *Providing or financing medical services* accounts for 1 percent or less of health R&D expenditures, contrasted with the ratio of this subfunction to total health outlays—80 percent of the total in 1972.

  Since 1969 fairly sizable R&D programs have been initiated in maternal and child health services, and currently these account for approximately 8 out of 10 dollars spent for research and development in the medical services area. Other programs are devoted to R&D work in patient care and Indian health.

DEVELOPMENT OF HEALTH RESOURCES

National Institutes of Health: HEW: The Institutes conduct, foster, and support research, development, and training programs that are designed to produce, test, and apply new knowledge to the causes, prevention, diagnosis, treatment, and control of the diseases in their respective areas. Most of this work is in the biomedical field.

R&D activities are carried out through the mechanism of research grants, direct laboratory and clinical research, and collaborative R&D programs conducted under contracts. Government laboratories and clinical facilities, universities, nonprofit institutions, and commercial concerns are used in the performance of Institute R&D programs.

HSMHA: Mental Health: HEW: Grants are awarded on a project basis for clinical, psychopharmacological, service developmental, and behavioral research in mental illness. Health support is given to clinical research centers, research in special areas—alcoholism, drug abuse, violence—and child mental health, and general research.

Direct R&D support is given to laboratory and clinical research in the behavioral and biological sciences—psychiatry, socioeconomic studies, neurobiology, and neurochemistry—and in special mental health problem areas—narcotic addiction, alcoholism, neuropharmacology, and clinical psychopharmacology.

Health Services Research and Development: Analyses are conducted of economic, social, and technological factors which affect the organization, financing, and utilization of health services. In 1972 the R&D effort will be expanded into health maintenance organization-like settings.

PREVENTION AND CONTROL

Environmental Control an
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HSMHA: Disease Control:
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Environmental Control and Air Pollution Control: EPA: Under air pollution control, grants awarded to universities and other nonprofit institutions to conduct research into air pollution problems. Contracts relating to fuels and vehicles are used to accelerate research and development into new and improved methods for prevention and control of air pollution from combustion of fuels. Special emphasis placed on development of technology for the control of sulfur oxides.

Direct operations include research into nature and extent of air pollution, its transport, its effects on humans, other biological systems, property, and the atmosphere itself, and in improvement in the means for controlling pollution.

Under environmental control solid-waste management includes research and development to ensure health protection and improved solid wastes disposal practices and technology. Also, radiological health includes research on the sources, levels, and effects of radiation, and development of criteria and standards for protecting the public.

Under pesticide research, grants awarded to State agencies, to universities, and to other institutions for the study of human health hazards associated with the use of pesticides and the finding of better techniques for investigating the biological hazards.

Studies conducted on the effects of pesticides on marine life and on the ecology of fishery resources that depend on estuaries and coastal environment. Research also conducted on pesticide-wildlife relationships and control methods.

HSMHA: Disease Control: HEW: Research grants awarded to organizations, institutions, and individuals for research connected with epidemiology, prevention, laboratory diagnosis, and treatment of communicable diseases at the community level. Studies conducted in epidemiology, prevention, detection, diagnosis, and therapy of tuberculosis. Research and evaluation activities carried on in veneral disease diagnosis, immunization, therapy, and control.

Research and evaluation activities directed to the identification of specific factors that cause nutritional diseases, relationship of nutrition to other health problems, and determination of extent of nutritional problems.

Research conducted to improve and standardize laboratory methodology and evaluate techniques, materials, and reagents.

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clinical research in the
socioeconomic studies,
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. In 1972 the R&D effort
zation-like settings.

Health research conducted toward prevention and control of occupational hazards and diseases.

Basic and applied research conducted on the sources, levels, and effects of both ionizing and nonionizing radiation and on means of protecting the public.

Community environment management focuses on research and management of environmental conditions associated with man's home, neighborhood, metropolitan area, and regional complexities.

Food and Drug Administration: HEW: Research and training grants awarded to State agencies, to universities, and to qualified nonprofit institutions for studies to determine harmful properties in milk and food and to develop methods to detect and prevent food contamination. Intramural and extramural studies conducted of food contamination as well as long-term, low-dose chemical feeding studies in animals. Chemical contamination in food covers such problems as natural poisons, drug residues, and food additives.

Research conducted in the safety and efficacy of drugs, notably oral contraceptives and drugs chemically identical but not therapeutically equal. Research grants awarded to universities and other eligible institutions for study of accidental poisonings, burns, and other injuries related to use or misuse of potentially hazardous products.

Development includes laboratory screening procedures, standardization and simplification of methods for identifying contaminants, better analytical methods, and methodology research.

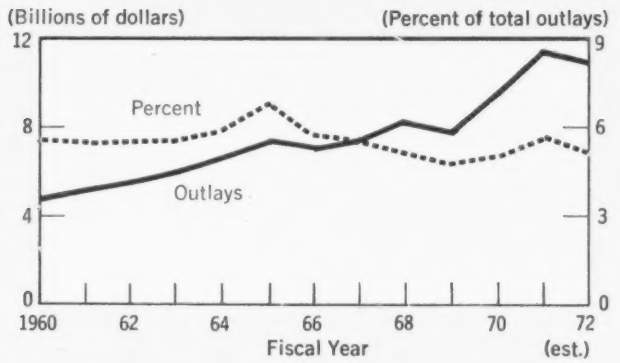
PROVIDING OR FINANCING MEDICAL SERVICES

HSMHA: Maternal and Child Health: HEW: Supports research that shows promise of substantial contribution to the advancement of maternal and child health or crippled children's services and that studies the effectiveness of such programs. Research grants, contracts, or jointly financed cooperative arrangements are used.

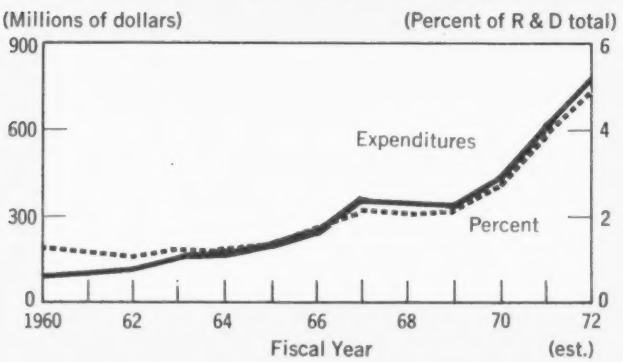
Efforts made to improve existing services, develop new programs, reduce costs, identify needs. Emphasis centers around infant mortality, nutritional needs of preschool children, development of prostheses for children, health needs of retarded children, and, more recently, around studies of health problems of low-birthweight infants.

COMMERCE AND TRANSPORTATION

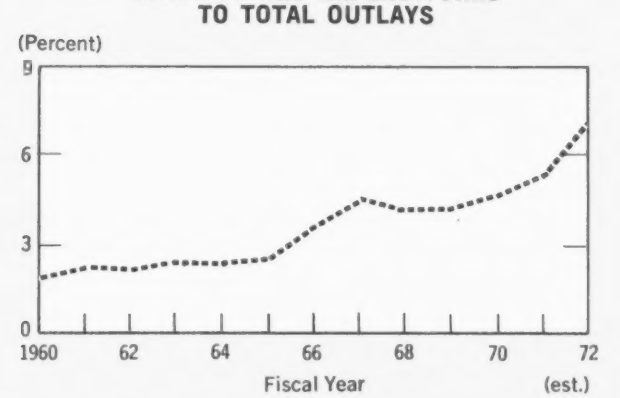
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

COMMERCE AN

Total outlays and R&D function in selected time

Total Federal outlays
Federal R&D expenditures

- Commerce and transp idly than total outlays the share of R&D acti tion has tended to grow
- Research and develop Federal R&D expenditu 1960).
- The decrease in total trend, is attributable will reduce net outlays

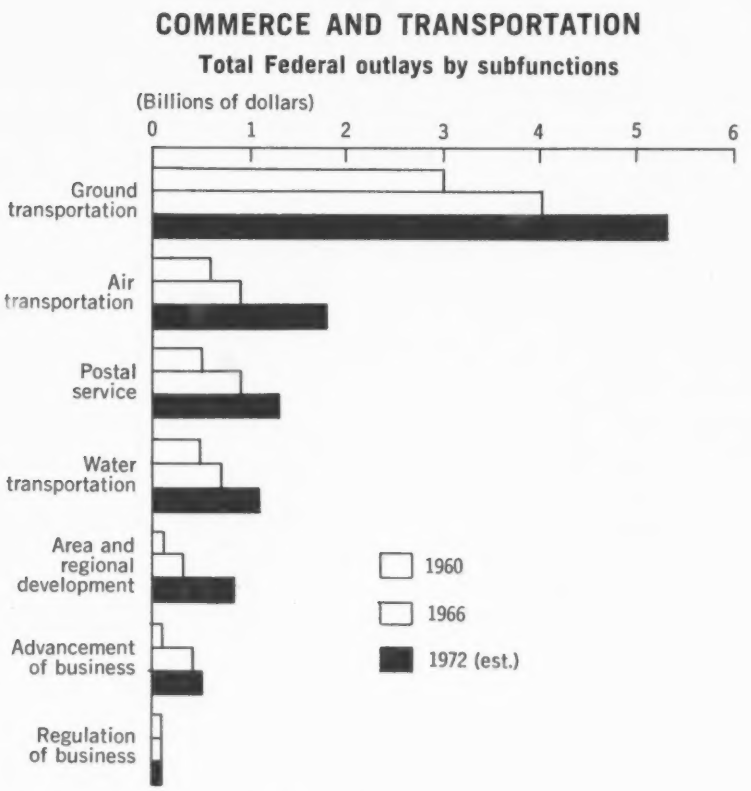
COMMERCE AND TRANSPORTATION

Total outlays and R&D expenditures for the commerce and transportation function in selected time periods changed as follows:

	Average annual percent change			
	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	6.9	6.7	22.9	−4.4
Federal R&D expenditures	19.0	14.2	46.6	26.5

- Commerce and transportation R&D expenditures are increasing more rapidly than total outlays, particularly in the current (1970–72) period. Thus, the share of R&D activities within the commerce and transportation function has tended to grow—from 2 percent in 1960 to 7 percent in 1972.
- Research and development in this area is also accounting for more of total Federal R&D expenditures—almost 5 percent in 1972 (up from 1 percent in 1960).
- The decrease in total outlays in 1972, which follows a long-term growth trend, is attributable primarily to an anticipated postal rate increase that will reduce net outlays in the postal service subfunction.

Total Outlays



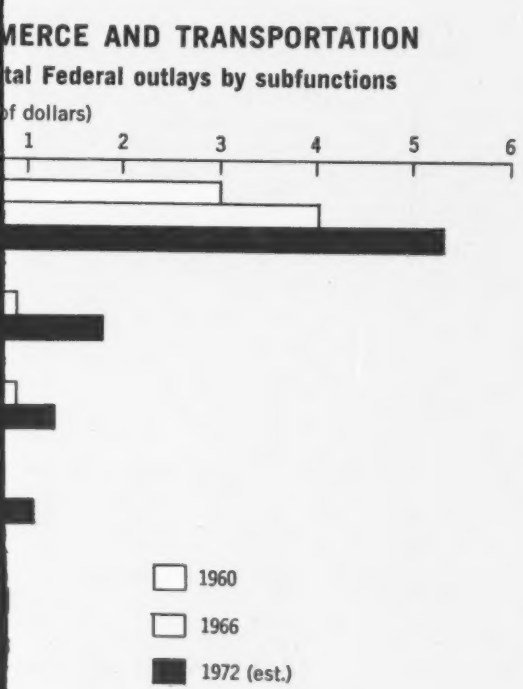
SOURCE: Office of Management and Budget

The commerce and transpo

- Ground transportati
- Air transportation
- Postal service
- Water transportatio
- Area and regional de
- Advancement of bus
- Regulation of busine

* Between 1960 and 1972 funded subfunction.

* However, in relative ter *transportation* and area a



Total Outlays

The commerce and transportation function has seven subfunctions:

- Ground transportation
- Air transportation
- Postal service
- Water transportation
- Area and regional development
- Advancement of business
- Regulation of business

- Between 1960 and 1972 *ground transportation* has been the most heavily funded subfunction.

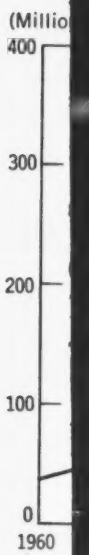
- However, in relative terms, the largest increases have been shown in *air transportation* and *area and regional development.*

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Commerce and transportation, total	$ 85.1	$241.5	$410.5	$601.9	$761.5
	Percent distribution				
Air transportation	44.9	58.5	40.9	49.9	47.9
Supersonic Aircraft (DOT)	—	41.1	27.1	38.6	36.9
Federal Aviation Admin. (DOT)	44.9	17.4	13.7	11.3	11.0
Advancement of business	36.3	28.9	28.1	22.8	19.4
National Oceanic and Atmospheric Administration (Commerce)	15.5	15.4	17.9	14.1	11.8
National Bureau of Standards (Commerce)	15.3	10.8	7.1	5.2	4.5
Office of the Secretary (DOT)	—	.4	1.8	2.2	1.9
Office of Business Economics (Commerce)	1.5	1.1	.9	.6	.6
Office of Telecommunications (Commerce)	—	—	—	.4	.4
Bureau of the Census (Commerce)	1.2	.8	.3	.2	.2
Patent Office (Commerce)	.5	.2	.1	.1	.1
Small Business Administration	2.4	.2	(1)	(1)	(1)
Ground transportation	5.4	3.3	15.5	15.0	18.7
Urban Mass Transportation Administration (DOT)	—	—	3.8	5.0	7.8
National Highway Traffic Safety Administration (DOT)	—	—	2.6	3.7	4.7
Federal Highway Administration (DOT)	5.4	2.5	6.6	3.9	3.8
Federal Railroad Administration (DOT)	—	.8	2.0	2.0	2.1
Urban Mass Transportation (HUD)	—	—	.5	.4	.3
Water transportation	6.1	5.5	5.6	5.1	6.9
U.S. Coast Guard (DOT)	.7	3.1	4.0	3.2	4.8
Maritime Administration (Commerce)	5.4	2.4	1.6	1.9	2.1
Postal service	6.9	3.4	7.2	6.2	6.4
Bureau of Research and Engineering (Postal Service)	6.9	3.4	7.2	6.2	6.4
Area and regional development	—	(1)	2.3	.8	.6
Economic Development Administration (Commerce)	—	(1)	2.3	.8	.6
Regulation of business	.4	.3	.3	.2	.2
Federal Trade Commission	.1	.1	.1	.1	.1
Federal Communications Commission	.1	.1	.1	.1	.1
Civil Aeronautics Board	.1	(1)	.1	(1)	(1)

[1] Less than 0.05 percent.



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1966	1970	1971	1972
(Dollars in millions)			
$241.5	$410.5	$601.9	$761.5
Percent distribution			
58.5	40.9	49.9	47.9
41.1	27.1	38.6	36.9
17.4	13.7	11.3	11.0
28.9	28.1	22.8	19.4
15.4	17.9	14.1	11.8
10.8	7.1	5.2	4.5
.4	1.8	2.2	1.9
1.1	.9	.6	.6
—	—	.4	.4
.8	.3	.2	.2
.2	.1	.1	.1
.2	(1)	(1)	(1)
3.3	15.5	15.0	18.7
—	3.8	5.0	7.8
—	2.6	3.7	4.7
2.5	6.6	3.9	3.8
.8	2.0	2.0	2.1
—	.5	.4	.3
5.5	5.6	5.1	6.9
3.1	4.0	3.2	4.8
2.4	1.6	1.9	2.1
3.4	7.2	6.2	6.4
3.4	7.2	6.2	6.4
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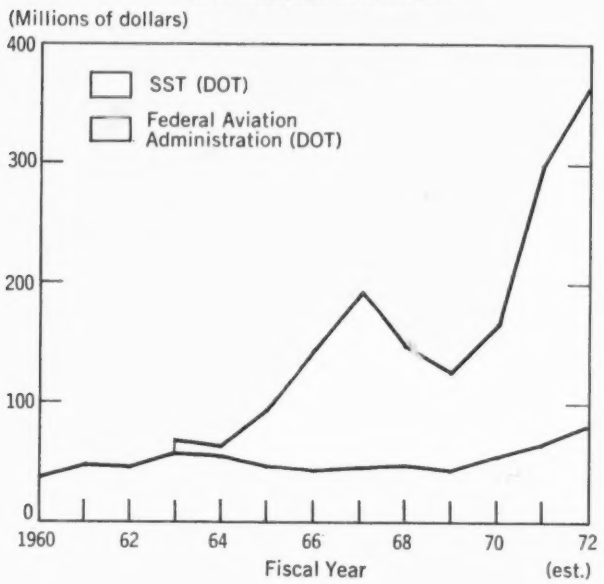
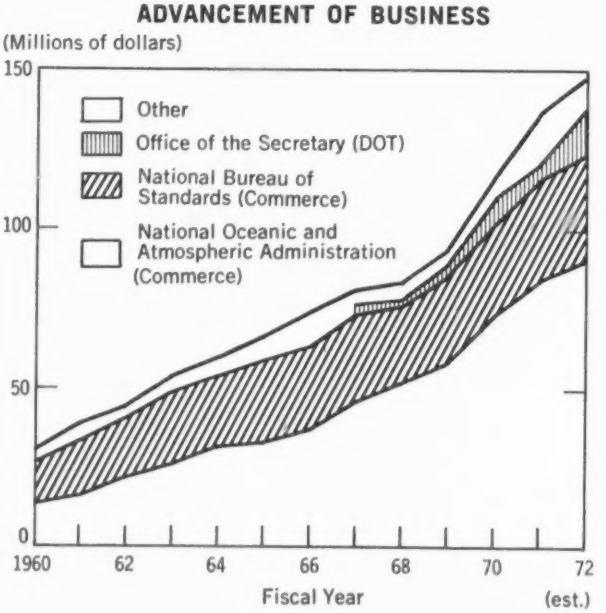
Federal R&D Expenditures by Subfunctions and Agency Programs

AIR TRANSPORTATION



ADVANCEMENT OF BUSINESS



SOURCES: Office of Management and Budget; National Science Foundation

Comments

- In R&D expenditures, *air transportation* has accounted for the largest funds by far. Since 1965, the primary reason is the high development cost associated with the civil supersonic air transport program.[1] In 1972 air transportation R&D programs are expected to represent 48 percent of all R&D efforts in the commerce and transportation function, although air transportation programs as a share of total outlays are expected to be 17 percent.

  Relatively large increases are estimated for the R&D activities of the Federal Aviation Administration during the current budget period. These increases are to permit the continuation of advanced research and development on equipment and techniques to fully automate certain elements of the air traffic control system to enable it to handle safely increasing volumes of aircraft.

- A number of R&D programs are related to *advancement of business*. The R&D activities of Commerce's National Oceanic and Atmospheric Administration (NOAA) and Commerce's National Bureau of Standards (NBS) account together for 16 percent of the entire function total in 1972.

[1] Expenditures for the SST in the table opposite are based on the President's 1972 budget and do not reflect congressional action on development funds for the last 3 months of fiscal year 1971 or any action for fiscal year 1972.

The National Oceanic
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In 1972 the NOAA incr
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The National Oceanic and Atmospheric Administration (NOAA) came into existence in October 1970 and is comprised of various marine-related activities that were formerly conducted by other agencies: weather forecasting, coast and geodetic survey activities, commercial and sport fisheries management, marine minerals technology, oceanographic data collection and analysis, oceanographic instrumentation, data buoy development, the Sea Grant programs, and the Great Lakes survey. However, the data are shown as though these programs had been part of NOAA since 1960.

In 1972 the NOAA increases will be directed to strengthening research on weather modification, improving detection and tracking of violent storms, and developing new methods for more accurate weather observation and forecasting; also to research directed toward conservation, development, and improved management of commercial fishery resources; and to the preparation for two international projects, the International Field Year for the Great Lakes and the tropical experiment of the Global Atmospheric Research Program.

In 1972 NBS will expand its research program to develop improved standards of physical measurement, to advance computer technology and pollution abatement technology, and to develop industrial and consumer products standards. Additional emphasis will also be given to building technology and flammable fabrics research programs.

- *Ground transportation* is expected to make up 19 percent of all R&D expenditures within commerce and transportation in 1972, compared with its 49-percent share of total outlays.

  All ground transportation R&D programs have shown large relative increases since 1966, but the largest dollar increases are expected in the current budget period. These increases are most marked in the areas of urban mass transportation and national highway safety.

  Increases in mass transportation are to initiate projects involving construction of new types of urban transportation systems in selected localities.

  Under highway safety, increases are directed to expanded research on techniques to counter driving by alcoholics and on improving the lifesaving characteristics of motor vehicle structures and systems. Additional funding will also be used for highway planning and research grants to States.

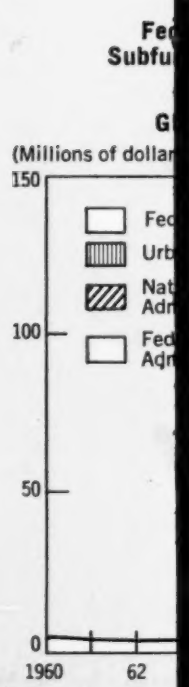
- *Water transportation* covers two R&D programs, but only since 1966 has the U.S. Coast Guard had larger dollar programs than the Maritime Administration. These programs have continued to grow absolutely and relatively. While the Maritime Administration has continued its programs relating to more efficient and competitive ship designs and operations, the Coast Guard, in addition to its rescue and safety work, has reflected the increased public pressure for better management of the environment.

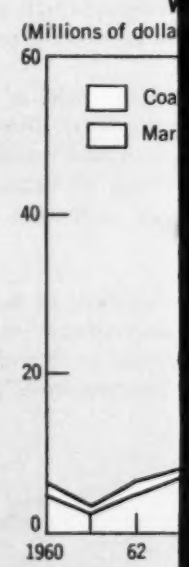
- The steep growth for the *postal service* in the current period reflects response to legislation passed in 1966 to encourage and advance the R&D programs of the Post Office Department.[2]

- Engagement in R&D programs under *area and regional development* has been sporadic from one year to the next. Most of these programs have been in the field of economics and have been used as background for the formulation of operating programs for aiding depressed regions.

- For *regulation of business* total R&D funding has increased gradually since 1964, mainly from growth in R&D programs of the Federal Communications Commission but also from work on the part of the Federal Trade Commission.

[2] Under legislation enacted in 1970, the Post Office Department will be replaced by the United States Postal Service in fiscal year 1972. The new Postal Service will be an independent establishment of the executive branch, directed by a bipartisan 11-member Board of Governors.





SOURCES: Office of

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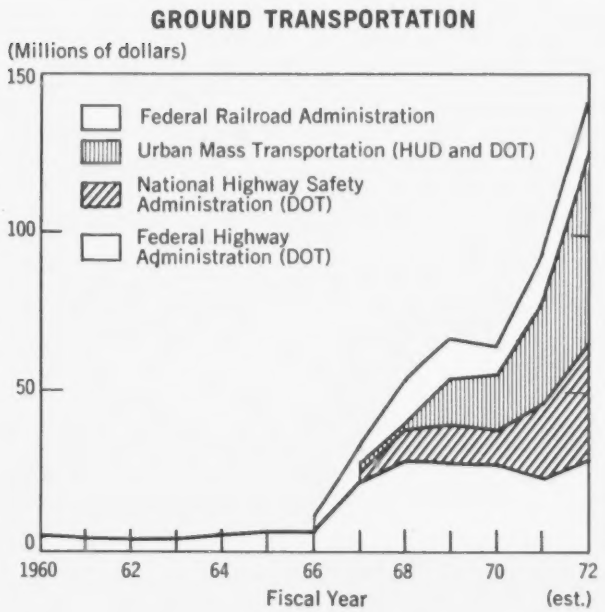

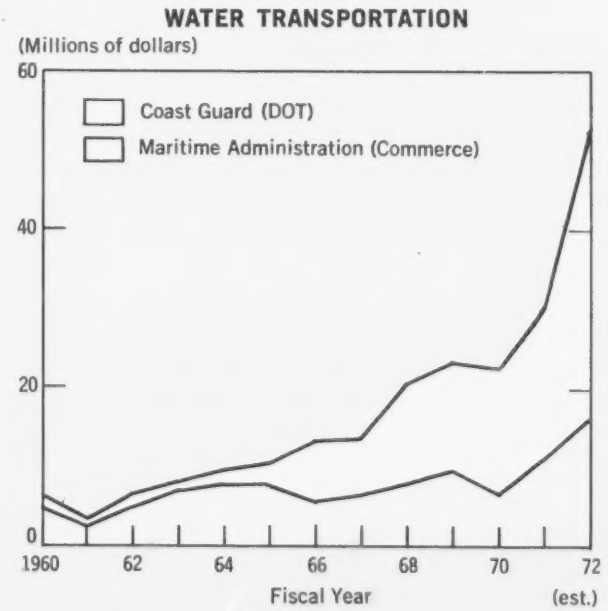

SOURCES: Office of Management and Budget; National Science Foundation

Summary of current commerce and transportation R&D programs

AIR TRANSPORTATION

Civil Supersonic Aircraft: DOT: Development of a supersonic transport that will be safe, economically profitable, and more technically advanced than any other commercial aircraft.

Federal Aviation Administration: DOT: Development focuses on systems for automation of air traffic control and toward solution of the problem of inadequate capacity in the airports/airways system. R&D programs conducted in navigation toward modernization, improvement, and expansion of the common system navigation facilities in the United States and overseas areas. R&D programs in aviation weather are directed toward development of devices and techniques for the communication and display of weather information in cooperation with DOD and Commerce. Study, development, and evaluation of devices conducted to enhance safety of civil aircraft, in cooperation with DOD and NASA. Aeromedical research directed toward the identification and elimination of those physical, physiological, and psychological factors which may affect personnel engaged in operation of the air traffic control systems.

ADVANCEMENT OF BUSINESS

National Oceanic and Atmospheric Administration: Commerce: Programs designed to increase the understanding of the composition and dynamics of the atmosphere, and to develop better instrumentation and techniques for weather observing, analysis and forecasting.

Research directed toward improvement of NOAA's mapping and charting, data acquisition, analysis, processing, and production capability and toward increasing understanding of ocean and lake properties, processes, and environmental interactions.

Research also directed toward understanding the intricate processes and phenomena of the solid earth, including deterioration of the size and shape of the earth and seismological studies and warnings.

Research covers living marine resources and improved methods of sport fishery management.

Research in the environmental satellite program helps determine the most beneficial method of data
The national Sea Grant progra
gent utilization of resources of
resource potential of the U.S. G
The development of a system
oceanic and atmospheric data is
Participation in the Global Atm
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National Bureau of Standards:
reproducible, and compatible p
and technology.
Programs include development
standards of physical measure
tions; e.g., national standards
quantities. Research is conduct
measure the physical and chem
natural phenomena.
Transfer services transfers the
elements of the Nation's meas
multidimensional metrology, las
rebuilt and relocated standard
mental research on reference ma
Programs conducted in areas w
technology; e.g., biomaterials,
composite materials, measurem
pollution abatement, R&D in bu
ment use of automatic data proc
Other activities promote a techn
and methods to promote publi
information sciences.

Office of the Secretary: DOT:
cludes programs to forecast tra
to help assess alternative course
statistical studies, and to examin
with changing economic, social,
Projects carried out to advance
tions to intermodal transportati
ogy; to conduct research on lo
mental studies related to SST ope
Research and studies to facilitate
the modernization of transportat

most beneficial method of data selection, collection, and use.
The national Sea Grant program covers research to assist in the intelligent utilization of resources of the seas and in the development of the resource potential of the U.S. Great Lakes.
The development of a system of automatic ocean buoys for obtaining oceanic and atmospheric data is also part of the NOAA program.
Participation in the Global Atmospheric Research Program and the International Field Year for the Great Lakes also included.

National Bureau of Standards: Commerce: Ensures meaningful, reliable, reproducible, and compatible physical measurements to users of science and technology.
Programs include development, maintenance, and improvement of the standards of physical measurement compatible with those of other nations; e.g., national standards for measurement of some 40 physical quantities. Research is conducted to learn new and improved ways to measure the physical and chemical properties of matter, materials, and natural phenomena.
Transfer services transfers the results of the Bureau's work to other elements of the Nation's measurement system. Emphasis planned for multidimensional metrology, laser measurements, operation of a newly rebuilt and relocated standard frequency broadcast station, and fundamental research on reference materials.
Programs conducted in areas where problems exist in effective use of technology; e.g., biomaterials, metals, alloys, polymers, inorganic and composite materials, measurement methods related to environmental pollution abatement, R&D in building materials, aid to effective Government use of automatic data processing, electronic technology.
Other activities promote a technical basis for equity in trade; standards and methods to promote public safety; research and development in information sciences.

Office of the Secretary: DOT: Transportation policy and planning includes programs to forecast transportation demand, to develop models to help assess alternative courses of action, to conduct economic and statistical studies, and to examine the interrelationship of transportation with changing economic, social, aesthetic, and environmental factors.
Projects carried out to advance transportation technology; to seek solutions to intermodal transportation problems; to forecast new technology; to conduct research on longer-range technical problems. Environmental studies related to SST operations will be given high priority.
Research and studies to facilitate the flow of passengers and cargo aim at the modernization of transportation documentation and procedures. Pro-

jects also aimed at cooperative R&D arrangements with foreign countries.
Other projects provide technical studies on consumer affairs, hazardous materials, and pipeline safety.

Office of Business Economics: Commerce: R&D work in preparation of national income and product data, with analysis of business trends, and with computation of the balance of international payments. All work related to national accounts of the short- and long-range outlook for the economy.

Office of Telecommunications: Commerce: Research, engineering, and analyses undertaken concerning economic opportunities for community cable distribution, communications alternatives for law enforcement and public safety, impact of new shared communication services, economic implications of various telecommunication interconnections and attachments, and radio resource management and economics.

Bureau of the Census: Commerce: R&D work on survey methods and techniques, including sample survey methods and theory, questionnaire design, response errors, equipment design and utilization, computer editing. Also, analytical techniques, including those for geographic analysis, to increase usefulness of data per unit of cost.

Patent Office: Commerce: Research devoted to devising solutions to search problems, particularly by mechanical methods of storage and retrieval. Also Patent Office data base program being designed to provide for the first time the full text of patents in machine-readable form. Ongoing effort with computer-oriented linear notation for chemical structures to be used for patent searches. Development of mechanized search files in selected art areas.

Small Business Administration: Studies affecting competitive strength of small business and of the effect on small business of Federal laws, programs, and regulations. Feasibility studies, market research, and identification and development of new business opportunities.

GROUND TRANSPORTATION

Urban Mass Transportation: DOT and HUD: R&D grants and contracts

awarded to assist in dev
all phases or urban mas
private nonprofit institut
hensive research in the p

National Highway Traffic
highway safety research
determine the relations
equipment performance
vehicles, and (2) the occ
such crashes. Includes re
by alcoholics, to improv
cles, and to fabricate a sr

Federal Highway Admir
traffic operations with p
in urban communities,
travel.
Research into social and
highway use to understa
ships of present and futu
Research to provide new
(1) improved design me
and (3) more effective
Program will also emph
and faster improved brid

Federal Railroad Adminis
ing of new or improved
components thereof, inc
nications, and guideways
Railroad research direct
hancing the environmen
ing 1972, major emphasis
dents caused by defecti
human error.

WATER TRANSPORTATION

U.S. Coast Guard: DOT:
improve rescue capabilit

awarded to assist in development, testing, and demonstration projects in all phases or urban mass transportation. Grants awarded to public and private nonprofit institutions of higher learning to help carry out comprehensive research in the problems of transportation in urban areas.

National Highway Traffic Safety Administration: DOT: Motor vehicle and highway safety research and development and the collection of data to determine the relationship between motor vehicle or motor vehicle equipment performance characteristics and (1) crashes involving motor vehicles, and (2) the occurrence of death or personal injury as a result of such crashes. Includes research projects on techniques to counter driving by alcoholics, to improve the crash survivability features of motor vehicles, and to fabricate a small number of experimental safety vehicles.

Federal Highway Administration: DOT: Research and development in traffic operations with primary emphasis on reducing traffic slow-downs in urban communities, especially during the peak hours of commuter travel.
Research into social and economic aspects of highway development and highway use to understand the needs, consequences, and interrelationships of present and future transportation systems.
Research to provide new methods for building highway facilities through (1) improved design methods, (2) improved specifications for materials, and (3) more effective engineering processes and use of computers. Program will also emphasize research into the causes of bridge failures and faster improved bridge-inspection techniques.

Federal Railroad Administration: DOT: Research, development, and testing of new or improved high-speed ground transportation systems or components thereof, including vehicle propulsion and control, communications, and guideways.
Railroad research directed toward solving critical safety problems, enhancing the environment, and promoting transportation efficiency. During 1972, major emphasis will be placed on research related to train accidents caused by defective tracks and roadbeds, equipment systems, or human error.

WATER TRANSPORTATION

U.S. Coast Guard: DOT: Projects to increase search effectiveness and to improve rescue capability under adverse weather conditions. Work to-

ward improvement in aids to navigation and marine traffic information systems in harbor areas, and development of a light-weight buoy system. Development of safety requirements for nonmilitary submersibles as well as development of better understanding of loading constraints, new concepts of design and operation of new vessels with emphasis on minimizing chances of pollution, work on fire-fighting equipment; analysis of marine accidents.

Testing of containment systems for oil pollution in the coastal and offshore environment; development of oil recovery systems and oil slick surveillance and forecasting systems.

Research leading to development of a Hazardous Material Information System.

Efforts toward reduction of boating accidents.

R&D work in oceanography, meteorology, and polar operations with emphasis on law enforcement responsibilities relating to pollution.

Maritime Administration: Commerce: Research planned to raise the level of marine scientific knowledge to advance the technological base upon which ships are designed, built, and operated. Primary research in hydrodynamics, propulsion, ship structures, navigation-communications electronics, and information-dissemination facilities and systems.

Economic research on transportation demands to help project ship numbers and characteristics; economic analyses of total transportation systems to determine economic and military requirements for future commercial shipping.

Advanced ship engineering and development, including nuclear and non-nuclear ship design programs, subsystems development, management systems, shipyard methods, development of computer-aided design programs.

Applied research into ship and port operations, covering equipment and procedures for navigation, cargo handling, automated control systems, containerization, manning, training and maintenance.

POSTAL SERVICE

Bureau of Research and Engineering: Postal Service: In-house and contractual general research, applied research, and development conducted, as well as systems planning and design, and industrial engineering programs. Programs involve application of advanced management sciences and technical skills to the identification and evaluation of new techno-

logical capabilities, the im
the planning and design of

AREA AND REGIONAL DEVELO

Economic Development A
gram of research, training,
and grants. The best talent
agencies, and private instit
dies of unemployment, un
information made available
of remedial programs.

REGULATION OF BUSINESS

Bureau of Economics: Fede
practices in various lines
economics of concentratio
tices: Reviews from a scie
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Textiles and Furs: Laborato
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Federal Communications
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pendence of computers in
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growth of new methods of
a computerized system for
systems is part of the progra

Bureau of Economics: Civil
of the air carrier industry,
regulatory function. Recurri
ment, industry, and public u

logical capabilities, the improvement of the working environment, and the planning and design of postal facilities and mechanized systems.

AREA AND REGIONAL DEVELOPMENT

Economic Development Administration: Commerce: A continuing program of research, training, and education performed through contracts and grants. The best talent available in universities, other governmental agencies, and private institutions helps determine the causes and remedies of unemployment, underemployment, and low incomes. Resulting information made available to help guide the formulation and evaluation of remedial programs.

REGULATION OF BUSINESS

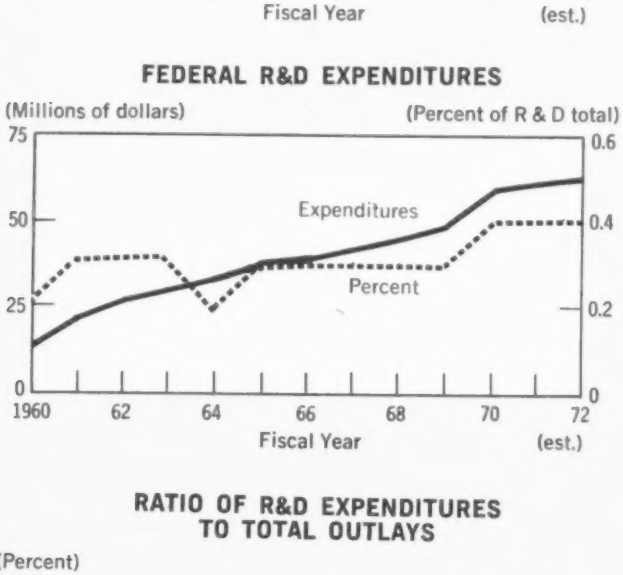
Bureau of Economics: Federal Trade Commission: Studies of competitive practices in various lines of industry and trade; basic research in the economics of concentration and integration. **Bureau of Deceptive Practices:** Reviews from a scientific standpoint on the truth or falsity of advertising of products. Monitoring of research on drugs and devices to determine therapeutic value in relation to advertised claims. **Bureau of Textiles and Furs:** Laboratory tests on textile fabrics and woolen fabrics for fibre content and flammability; on fur products to determine type of fur and presence of dyeing or bleaching.

Federal Communications Commission: Broad studies conducted designed to improve utilization of the radio spectrum. Studies are made of feasibility and methodology of increased intra- and inter-service sharing of frequencies. Study made of regulatory issues involved in the interdependence of computers in the communications industry. Study undertaken of broadband communications technology to plan for orderly growth of new methods of communication. Design and development of a computerized system for making frequency assignments for microwave systems is part of the program.

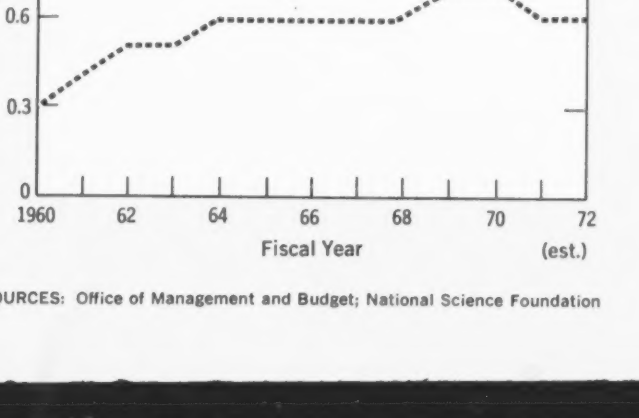
Bureau of Economics: Civil Aeronautics Board: Research into economics of the air carrier industry, primarily in connection with the Board's regulatory function. Recurring and special statistical reports for Government, industry, and public use.

VETERANS BENEFITS AND SERVICES

TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS

SOURCES: Office of Management and Budget; National Science Foundation

Growth rates for this fun

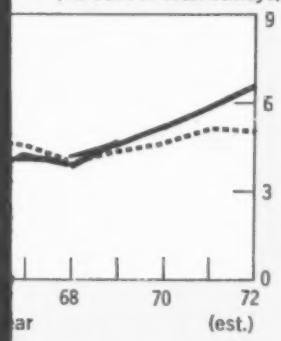
Total Federal outlays .....
Federal R&D expenditures ..

- Outlays for the veteran rapidly since 1966, main added to veteran needs.
- Total outlays have alm expenditures have mor make up less than 1 p services.
- The fact that such a h payments are determine stability of growth. This total outlays, but within fits and services R&D sha

S AND SERVICES

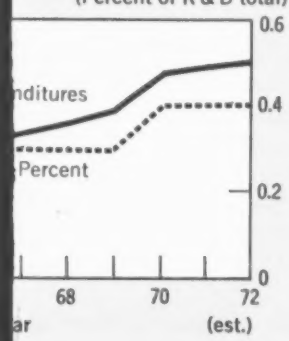
L OUTLAYS

(Percent of total outlays)



PENDITURES

(Percent of R & D total)



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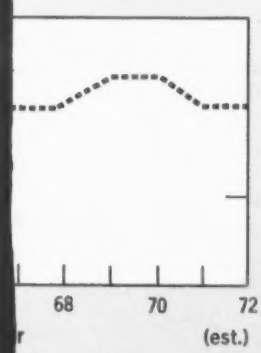


National Science Foundation

VETERANS BENEFITS AND SERVICES

Growth rates for this function are given in the following table:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	1.5	10.0	14.9	6.8
Federal R&D expenditures	17.5	10.9	5.5	1.1

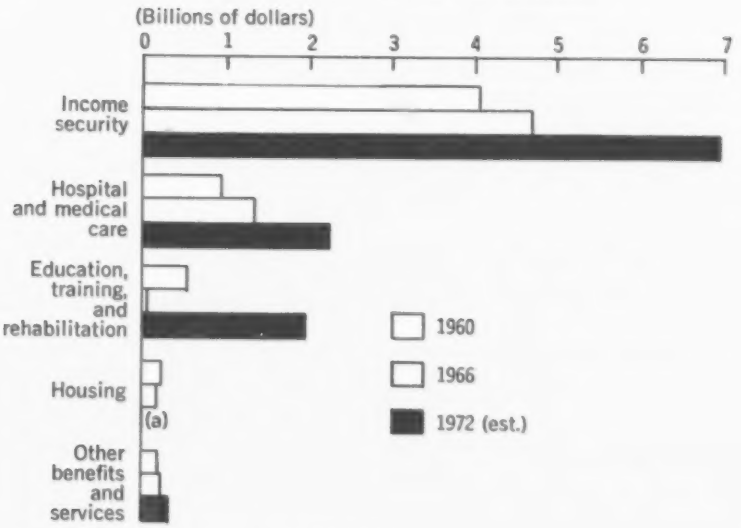
- Outlays for the veterans benefits and services function have grown fairly rapidly since 1966, mainly as a result of stepped-up military activities which added to veteran needs.

- Total outlays have almost doubled in the 1960–72 period whereas R&D expenditures have more than quadrupled. Even so, R&D expenditures still make up less than 1 percent of total outlays for veterans benefits and services.

- The fact that such a high proportion of veterans benefits and services payments are determined by the number of eligible beneficiaries makes for stability of growth. This function has always been one of the larger ones in total outlays, but within total Federal R&D expenditures the veterans benefits and services R&D share is one of the smallest.

VETERANS BENEFITS AND SERVICES

Total Federal outlays by subfunctions



(a) This subfunction is expected to have more incoming receipts than expenditures in 1972.

SOURCE: Office of Management and Budget

Total Outlays

Veterans benefits an

- Income security
- Hospital and me
- Veterans educat
- Other veterans
- Veterans housin

- The *income security* outlays, and in 197 services outlays are and life insurance pa

- *Hospital and medic* connected disabilitie veterans with disab such care.

- *Veterans education,* grams are found th Higher payment rate large increase in 197

SERVICES
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Total Outlays

Veterans benefits and services is divided into five subfunctions:

- Income security for veterans
- Hospital and medical care for veterans
- Veterans education, training, and rehabilitation
- Other veterans benefits and services
- Veterans housing

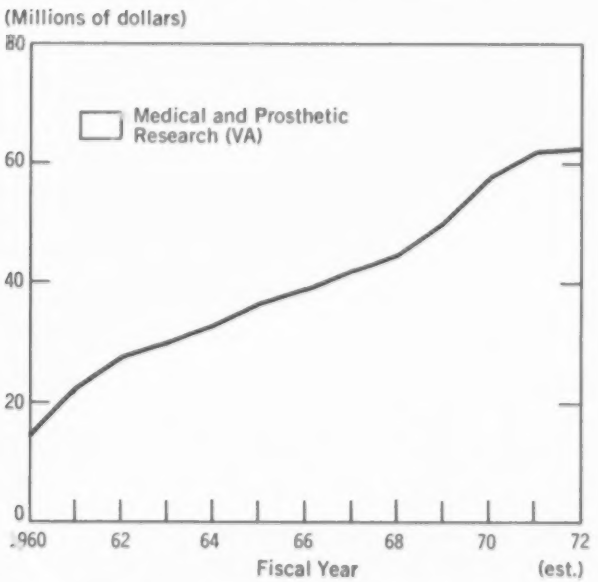
- The *income security* subfunction has always led the others in size of total outlays, and in 1972 approximately 65 percent of all veterans benefits and services outlays are expected to be in the form of compensation, pension, and life insurance payments.

- *Hospital and medical care* is next in size. By law all veterans with service-connected disabilities are assured of care. Hospital care is also provided for veterans with disabilities unrelated to service who are unable to pay for such care.

- *Veterans education, training, and rehabilitation* is the category where programs are found that help the returning veteran develop his capabilities. Higher payment rates and increases in numbers of trainees account for the large increase in 1972 over 1966.

Federal R&D Expenditures by Subfunctions and Agency Programs

HOSPITAL AND MEDICAL CARE



SOURCES: Office of Management and Budget; National Science Foundation

Trends in R&D Programs

Veterans benefits and services, total	
Hospital and medical care for veterans	
Medical and prosthetic research and development (VA)	
Income security for veterans	
Veterans education, training, and rehabilitation	
Veterans housing	
Other veterans benefits and services	

Comments

- All R&D programs within found under one subfunc programs have shown a st

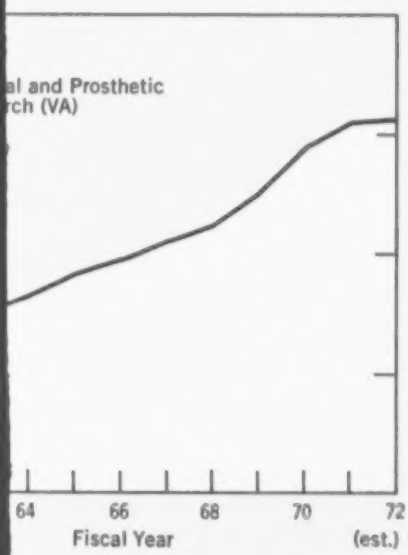
  Although this subfunction it represents only 21 perce

  These R&D expenditures improve patient care and

Research and Development

eral R&D Expenditures by ctions and Agency Programs

PITAL AND MEDICAL CARE



gement and Budget; National Science Foundation

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Veterans benefits and services, total	$14.6	$38.4	$58.1	$61.3	$62.0
	Percent distribution				
Hospital and medical care for veterans	100.0	100.0	100.0	100.0	100.0
Medical and prosthetic research and development (VA)	100.0	100.0	100.0	100.0	100.0
Income security for veterans	—	—	—	—	—
Veterans education, training, and rehabilitation	—	—	—	—	—
Veterans housing	—	—	—	—	—
Other veterans benefits and services	—	—	—	—	—

Comments

- All R&D programs within the veterans benefits and services function are found under one subfunction, *hospital and medical care for veterans*. These programs have shown a steady growth trend in the 1960–72 period.

  Although this subfunction represents 100 percent of the R&D expenditures, it represents only 21 percent of the total outlays scheduled for 1972.

  These R&D expenditures reflect a well established program of work to improve patient care and teaching at VA hospitals.

HOSPITAL AND MEDICAL CARE FOR VETERANS

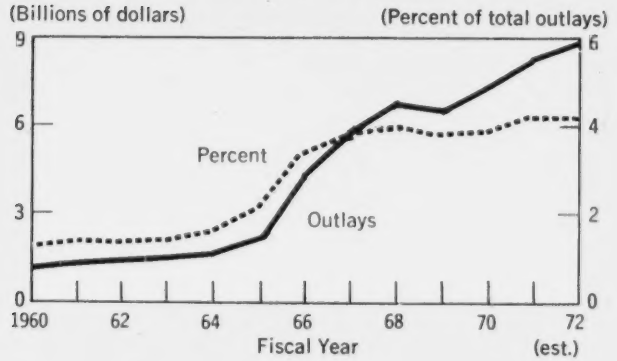
Medical and Prosthetic Research and Development: VA: Diverse activities having an impact on patient care and teaching functions. Includes improvement of diagnostic and teaching methods, contributions to medical knowledge, creation of a self-improvement environment, promotion of research in the basic sciences, and aid in the recruitment of VA physicians and scientists.

Programs cover locomotion, anthropometric analyses, pressure distributions at stump-socket interface, criteria for optimum sites of amputation, control of prostheses, psychoacoustic interactions between hearing aids and users, and formulation of principles for synthesizing speechlike outputs of reading machines for the blind.

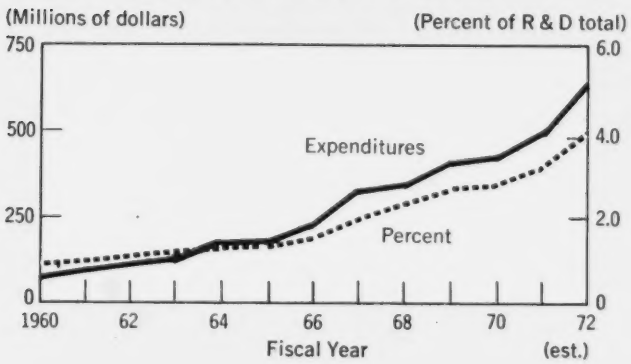
Development of specific devices and techniques in the prosthetic and sensory aids field is significant in the program. Some of the devices are reading machines and guidance devices for the blind, braces, modular prostheses, and externally powered prosthetic components.

EDUCATION AND MANPOWER

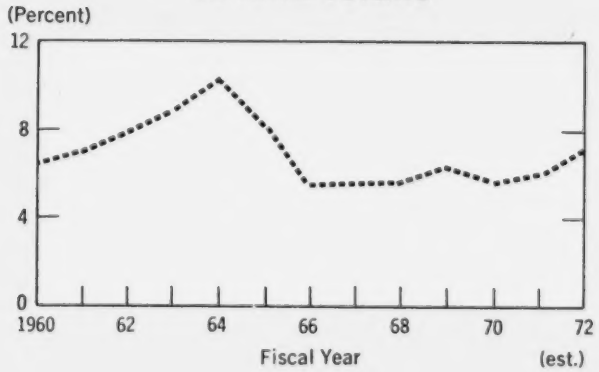
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

Total outlays and R&
tion showed the followi

Total Federal outlays	
Federal R&D expenditures	

- Total outlays for edu
1960 and 1972, but n
- The growth in R&D e
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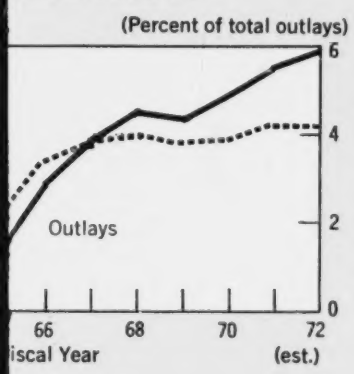
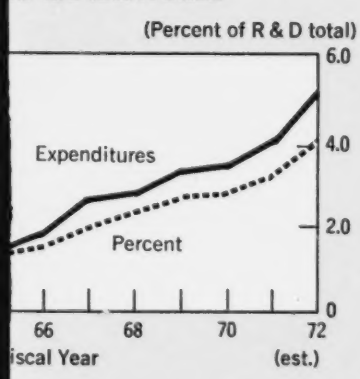
gain is scheduled for
- The R&D-to-total-out
sharp drop between
in education and scie

AND MANPOWER

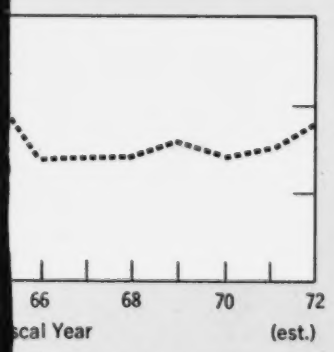
DERAL OUTLAYS



&D EXPENDITURES



&D EXPENDITURES
AL OUTLAYS



d Budget; National Science Foundation

EDUCATION AND MANPOWER

Total outlays and R&D expenditures for the education and manpower function showed the following rates of change:

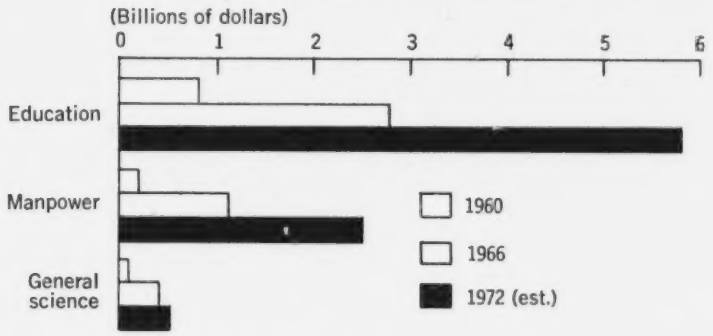
Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	25.0	14.4	13.9	6.1
Federal R&D expenditures	22.0	16.5	16.2	25.3

- Total outlays for education and manpower have risen eightfold between 1960 and 1972, but most of the increase in dollars has occurred since 1965.
- The growth in R&D expenditures has been steadier and slightly greater than for total outlays—a ninefold increase in the 1960–72 period. The largest gain is scheduled for 1972.
- The R&D-to-total-outlay ratio currently shows a tendency to rise (after a sharp drop between 1964 and 1966), influenced most heavily by programs in education and science support.

EDUCATION AND MANPOWER

Total Federal outlays by subfunction groups



SOURCE: Office of Management and Budget

Total Outlays

The education and m
grouped under the follo

Education

- Elementary and s
- Higher education
- Vocational educa
- Other manpower

Manpower

- Manpower trainin
- Other manpower

General Science

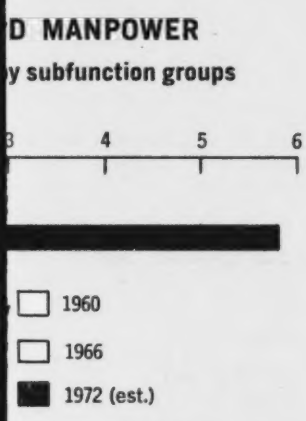
- Science educatio

- Within *education* 45
programs for presch
1960–72 period. Dur
education total has b
financial assistance t
assistance to vocation

- Most of the *manpow*
have been devoted t
the objective of enabl
tive, self-sufficient me

- *General science* outl
Science Foundation.[1]
equally divided betw
research. The 1972 b
search, especially that
grams to expand gener

[1] As indicated earlier, this c
mission is to strengthen science
primary mission; e.g., DOD scie



Total Outlays

The education and manpower function consists of seven subfunctions grouped under the following headings:

Education

- Elementary and secondary education
- Higher education
- Vocational education
- Other manpower aids

Manpower

- Manpower training and employment services
- Other manpower aids

General Science

- Science education and basic research

- Within *education* 45 to 65 percent of all outlays has been devoted to programs for preschool, elementary, and secondary school students in the 1960–72 period. During recent years another 25 to 30 percent of the education total has been directed to higher education programs, including financial assistance to students. The remainder has been divided between assistance to vocational education and other education aid programs.

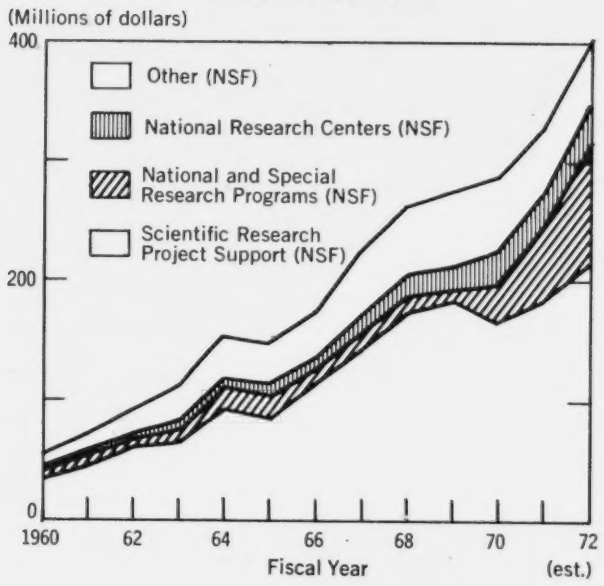
- Most of the *manpower* outlays in all years—about 90 percent since 1966—have been devoted to manpower training and employment services with the objective of enabling workers and potential workers to become productive, self-sufficient members of the labor force.

- *General science* outlays encompass only the programs of the National Science Foundation.[1] In earlier years Foundation efforts were almost equally divided between support for science education and support for research. The 1972 budget reflects a shift toward greater support of research, especially that directed to national problems, and away from programs to expand general training and research capacity.

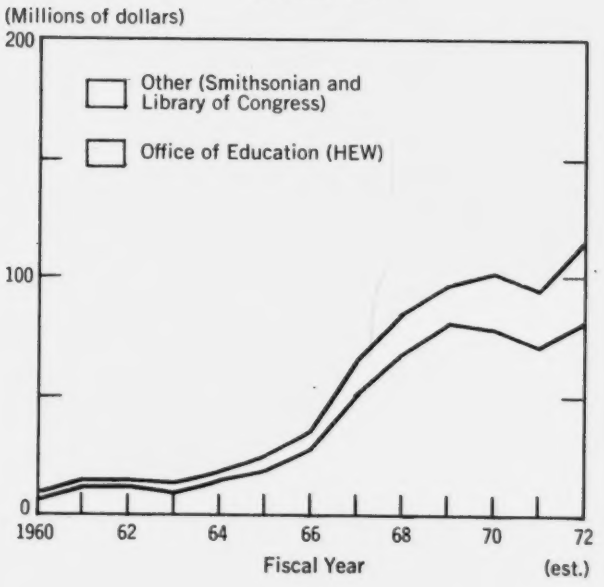
[1] As indicated earlier, this category includes only the programs of the agency whose primary mission is to strengthen science. The scientific programs of other agencies are included under their primary mission; e.g., DOD science programs are under national defense.

Federal R&D Expenditures by Subfunctions and Agency Programs

GENERAL SCIENCE



EDUCATION



SOURCES: Office of Management and Budget; National Science Foundation

Research and Devel

Trends in R&D Programs

Education and manpower, total	..
General science	.....
Science research project support (NSF)	.....
National and special research programs (NSF)	.....
National research centers (NSF)	..
All other research and development (NSF)	.....
Education	.....
Office of Education (HEW)	.....
Smithsonian Institution	.....
Office of Child Development (HEW)	
Library of Congress	.....
Manpower	.....
Bureau of Mines, Health and Safety (Interior)	.....
Manpower Administration (Labor)	.
Bureau of Labor Statistics (Labor)	
Workplace Standards Administration (Labor)	.....
Labor Management Services Administration (Labor)	.....

[1] Less than 0.05 percent.

Comments

* The *general science* subfuncti
support within the educatio
percent in 1972. All of its
Science Foundation.

by
grams

Science Foundation

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Education and manpower, total	$ 68.6	$231.8	$427.1	$496.1	$621.7
	Percent distribution				
General science	84.0	75.8	67.5	65.9	64.4
Science research project support (NSF)	53.4	49.2	39.1	37.7	34.3
National and special research programs (NSF)	6.7	5.7	7.1	12.3	16.6
National research centers (NSF)	2.6	5.0	6.5	5.9	5.4
All other research and development (NSF)	21.3	15.9	14.8	10.0	8.3
Education	11.2	19.8	27.1	25.2	26.5
Office of Education (HEW)	9.5	16.2	21.7	19.4	19.4
Smithsonian Institution	1.7	3.4	4.7	4.7	4.9
Office of Child Development (HEW)	—	—	.2	.5	1.7
Library of Congress	—	.2	.5	.6	.5
Manpower	4.8	4.4	5.4	8.8	9.1
Bureau of Mines, Health and Safety (Interior)	1.3	.9	.7	4.0	5.1
Manpower Administration (Labor)	1.3	1.7	3.2	3.4	2.8
Bureau of Labor Statistics (Labor)	1.6	1.3	.9	.7	.6
Workplace Standards Administration (Labor)	.6	.6	.5	.5	.4
Labor Management Services Administration (Labor)	—	[1]	.1	.1	.1

[1] Less than 0.05 percent.

Comments

- The *general science* subfunction has continued to receive most of the R&D support within the education and manpower function—an estimated 64 percent in 1972. All of its programs have been funded by the National Science Foundation.

Between 1960 and 1972 R&D expenditures for general science will have increased sevenfold, with the biggest dollar increase scheduled for 1972.

The largest 1972 increases are planned for national and special research programs. These increases permit expansion and initiation of major coordinated research efforts focused on the development of scientific knowledge for the solution of national problems and for advancement of the Nation's technology and economic productivity. Increases also provide for the transfer of funding responsibility for logistic support of the U.S. Antarctic research program from DOD to NSF.

Substantial increases are also planned in 1972 for science research project support to include important basic research efforts that have previously received support from other agencies, and to increase efforts in those areas of basic research where new knowledge is required to solve some of the serious environmental and social problems facing the Nation. The 1972 estimate includes funds for the support of the Interdisciplinary Laboratories (materials research laboratories) previously funded by DOD.

- The *education* area leads in total outlays, and it is growing in terms of R&D support. Nearly all of this support is reported under "other education aids" even though many R&D programs are directly relatable to specific areas of education (higher education, secondary education, etc.)

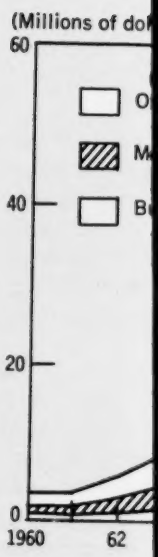
R&D expenditures for all areas of education are expected to be 3 percent of total outlays for education in 1972, compared with 1 percent in 1960.

Throughout the 1960–72 period HEW's Office of Education has provided about 75 percent to 80 percent of the support for research and development in education. Most of the increases in the current budget period are related to support for vocational research and educational improvement of the handicapped.

Research conducted by the Smithsonian Institution has increased considerably in recent years with the additional funds currently directed mainly into biological and anthropological programs.

- R&D programs in the *manpower* area have shown substantial growth since 1960, especially during the current (1970–72) budget period.

The health and safety programs of the Bureau of Mines are primarily responsible for this growth. The 1972 estimates provide for increases in research to reduce health and safety hazards in coal mines and in metal and nonmetal mining.



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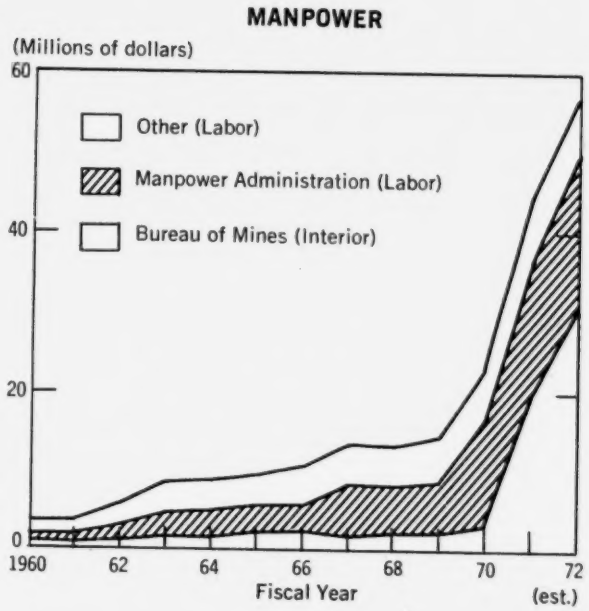
Federal R&D Expenditures by Subfunctions and Agency Programs



SOURCES: Office of Management and Budget; National Science Foundation

Summary of current education and manpower R&D programs

GENERAL SCIENCE

Scientific Research Project Support: NSF: Support for research to increase basic understanding of man and his physical and social environments through improved knowledge of fundamental processes and phenomena support for all scientific fields and disciplines, including biological, physical and environmental research, and research on man, his societies, and the institutions created by him. Almost all of support given to researchers in universities, colleges, and other nonprofit institutions.

National and Special Research Programs: NSF: Major research efforts involve extensive coordination of planning, funding and logistic support or are directed at specific problems of national concern. Includes the International Biological Program (IBP), the International Decade of Ocean Exploration (IDOE) program, earthquake engineering, the Arctic and Antarctic research programs, and others. Under this heading the Foundation is bringing together a number of program elements in a major research effort aimed at stimulating the application of scientific knowledge to the solution of major national problems and advancing the Nation's technology and economic productivity.

National Research Centers: NSF: Support provided for the development and operation of five national research centers. These centers have been established to meet national needs for research in astronomy and the atmospheric sciences that calls for equipment, staffing and operational support beyond the financial capabilities of individual academic institutions.

All Other Research and Development: NSF: Covers a number of programs and activities, including institutional grants for science in support of high-priority research to better utilize existing science capabilities,

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R&D support designed to improve scientific information services, development of course content improvement for science courses, and the central support services, management, and direction required to administer all of the Foundation's R&D programs.

EDUCATION

Office of Education: HEW: R&D work on early childhood education, reading, organization and administration, and higher education programs. Research and development are also directed toward environmental and drug abuse education, and nutrition for school-age children. Support continues for the R&D aspects of the Sesame Street television program for preschool children.

Basic studies cover the psychological, sociological, and physiological foundations of the learning and teaching process. Applied studies apply fundamental findings to vocational education and career choices, library improvement, bilingual and foreign language instruction, minority group achievement, early childhood education, basic learning skills, education of the handicapped, etc.

Development builds upon fundamental knowledge to yield better materials, methods, and mechanisms for use in learning and teaching situations.

Smithsonian Institution: Research in the natural and physical sciences and in the history of cultures, technology, and the arts; research on environmental sciences problems.

Office of Child Development: HEW: Support is provided for research projects and grants designed to increase knowledge of early childhood programs; to develop evaluative instruments and norms for young children; to improve foster care and adoption systems; and to develop better statistical reporting on current services provided for young children.

Research connected with the Head Start program is also included in the activities of this office.

Library of Congress: R&D work on scientific communication and documentation, involving automation of processing and distribution of information. Studies are being made of all the possibilities of automation of the Library of Congress in relation to other U.S. research libraries.

MANPOWER

Bureau of Mines (Health and Safety): Interior: Research on mining procedures and devices to avoid, detect, or control hazards to miners. Research conducted to develop technology for safer mining methods, equipment, techniques, and systems. R&D efforts cover the support of mine roof and control of overburden; ventilation; allaying combustible dust, methane, and other air contaminants; prevention of underground fires and explosions; provision of safe equipment; reduction of machine noise; and improvement of postdisaster life support and rescue technology.

Manpower Administration: Labor: Research to improve the potential of workers; to make manpower programs more effective; and to assess economic and social influences on the work force. Includes such studies as upgrade training for the employed, decisionmaking in establishment of training programs, high dropout rate in apprenticeship programs, youth employment problems, public sector employment, etc. Development of competent manpower research workers achieved through research grants to study a range of manpower problems at colleges and universities.

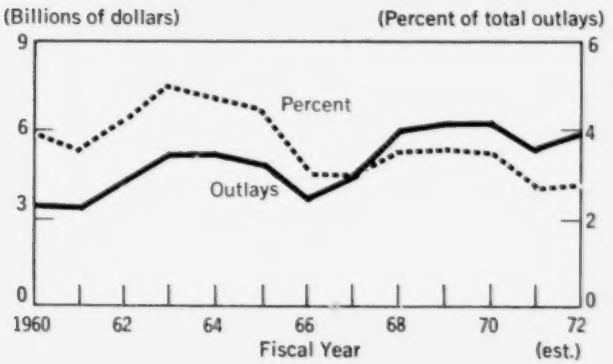
Bureau of Labor Statistics: Labor: Research on manpower and employment, on prices and cost of living, and on productivity technology, and growth. Research continues to improve existing price indexes and develop new ones; e.g., a constant-utility cost-of-living index. Research also continues on the Interagency Economic Growth Project to provide a more comprehensive and integrated framework for analyzing the long-term economic growth for employment opportunities.

Workplace Standards Administration: Labor: Research on social and economic effects of labor standards, including minimum wage, overtime, equal pay, child labor, and age discrimination. Research on industrial accidents for use as a basis for accident-prevention activities and development of safety codes.

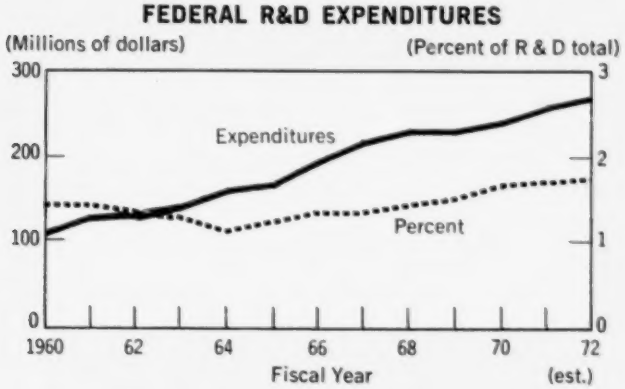
Labor-Management Services Administration: Labor: Research in labor-management relations practices and policy and union procedures.

AGRICULTURE AND RURAL DEVELOPMENT

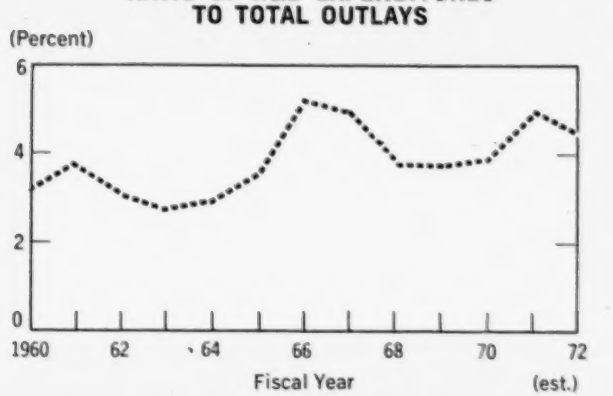
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

AGRICULTURE

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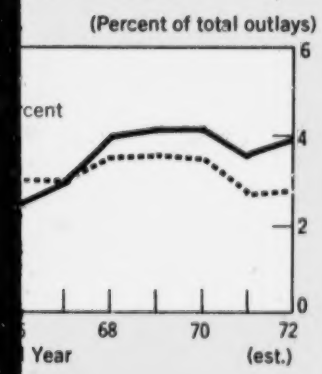

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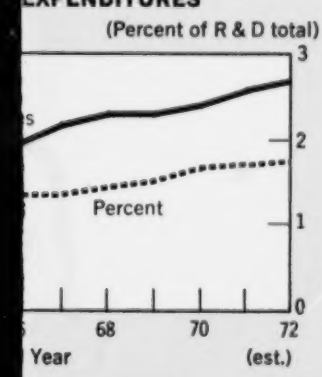

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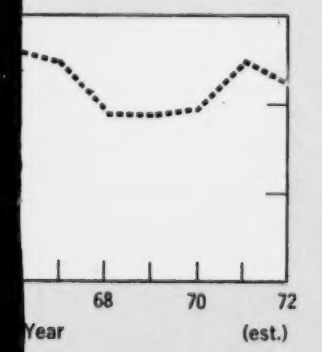


udget; National Science Foundation

AGRICULTURE AND RURAL DEVELOPMENT

Average annual rates of change for total outlays and R&D expenditures for agriculture and rural development are shown in the following table:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	1.7	13.9	—15.1	10.3
Federal R&D expenditures	11.0	5.0	7.5	1.9

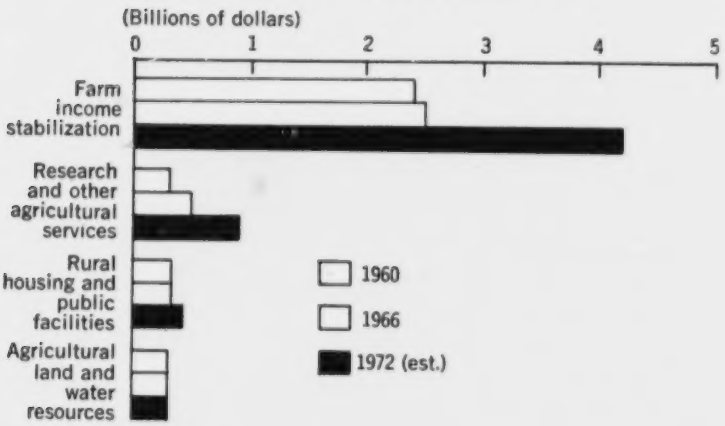
- Agriculture and rural development is characterized by a relative decline in the 1960–72 period. Total outlays for agriculture multiplied 1.7 times while total Federal outlays more than doubled. Thus, the share of agriculture moved from 4 percent to 3 percent of the total.

- R&D expenditures for agriculture more than doubled in the same period, and they show particular strength since 1966 when compared to the trend in total Federal R&D expenditures. R&D expenditures as a share in the Federal R&D total have shown a slight increase from 1.4 percent in 1960 to 1.7 percent in 1972.

- R&D expenditures for agriculture as a percent of total outlays for that function have risen from 3 percent in 1960 to 4½ percent in 1972.

AGRICULTURE AND RURAL DEVELOPMENT

Total Federal outlays by subfunctions



SOURCE: Office of Management and Budget

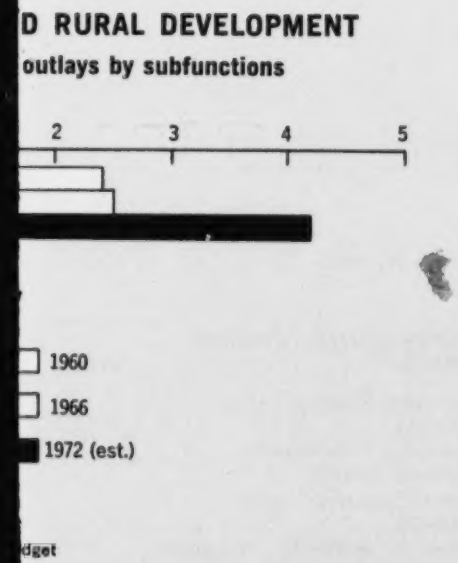
Total Outlay

There are four subfu

- Farm income
- Research and
- Rural housing
- Agricultural l

- *Farm income stab* function. Its most program, which ha

- *Research and oth* relatively more o within agriculture period.



Total Outlays

There are four subfunctions in agriculture and rural development:

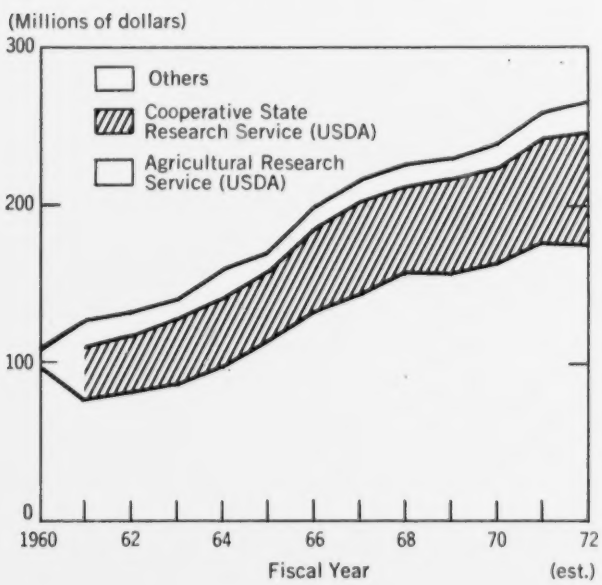
- Farm income stabilization
- Research and other agricultural services
- Rural housing and public facilities
- Agricultural land and water resources

- *Farm income stabilization* has always been the most heavily funded subfunction. Its most important component is the agricultural price support program, which has grown considerably in recent years.

- *Research and other agricultural services,* though far smaller, has grown relatively more over the years 1960 to 1972. It is the only subfunction within agriculture to show a steady rise in each year of the 1960–72 period.

Federal R&D Expenditures by Subfunctions and Agency Programs

RESEARCH AND OTHER AGRICULTURAL SERVICES



SOURCES: Office of Management and Budget; National Science Foundation

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Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Agriculture, total	$105.2	$196.6	$239.5	$257.4	$262.2
	Percent distribution				
Research and other agricultural services	100.0	100.0	100.0	100.0	100.0
Agricultural Research Service (USDA)	99.3	67.4	67.3	66.9	65.8
Cooperative State Research Service (USDA)	—	26.3	25.2	26.4	27.7
Economic Research Service (USDA)	—	5.5	6.6	5.9	5.7
Farmer Cooperative State Research Service (USDA)	.4	.4	.4	.4	.4
Statistical Reporting Service (USDA)	—	.4	.3	.3	.3
National Agricultural Library (USDA)	.3	.1	.2	.2	.2
Farm income stabilization	—	—	—	—	—
Rural housing and public facilities	—	—	—	—	—
Agricultural land and water resources	—	—	—	—	—

Comments

- All the funds for research and development are channeled into one subfunction, *research and other agricultural services.*

  Within it the Agricultural Research Service, Cooperative State Research Service, and Economic Research Service jointly spend over 99 percent of the R&D funds.

  The Agricultural Research Service spends 66 percent of the funds.

Summary of current agriculture and rural development R&D programs

RESEARCH AND OTHER AGRICULTURAL SERVICES

Agricultural Research Service: USDA: Conducts basic and applied research relating to the production, utilization and marketing of agricultural products, and research on nutrition and consumer use. Farm research covers animal husbandry, animal disease and parasite research, crop research, entomological research, soil and water management, and agricultural engineering research. Utilization R&D develops increased industrial uses for farm products, new and improved foods, feeds and fabrics, and improved methods for processing agricultural commodities. Nutritional research is concerned with requirements, composition, and nutritive value of foods. Marketing research works to find practical answers to reducing costs and maintaining product quality in moving products from farm to consumer.

Cooperative State Research Service: USDA: Primarily administers funds to State experiment stations and other eligible institutions for support of research in agriculture, the rural home and community, and forestry. Grants under the Hatch Act are allocated to agricultural experiment stations of the land-grant colleges for agricultural research, and grants for cooperative forestry research are allocated to land-grant colleges and other State-supported colleges and universities. Grants for support of specific research projects are made to nonprofit institutions (higher education and other).

Economic Research Service: USDA: Conducts research to measure, appraise, and analyze economic changes that occur in farming and in the use of human and natural rural resources and to indicate needed adjustments. Research is also conducted in marketing economics into aspects of marketing farm products and market structure. Domestic and foreign economic analysis covers commodities, farm income, product demand, long-term projections, historical developments. It also covers trade studies and studies of forces affecting foreign farm products and their impact on U.S. agricultural exports.

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work.

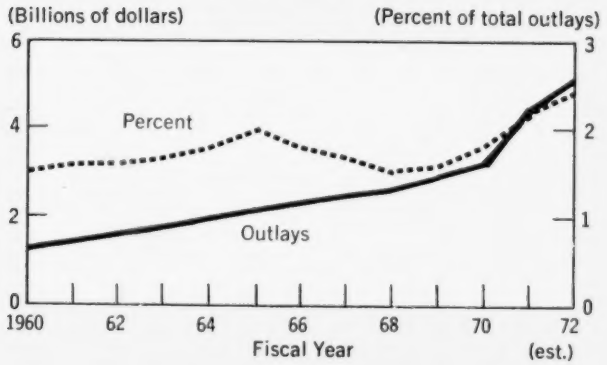
Farmer Cooperative Service: USDA: Studies the problems relating to organization, financing, management, and marketing of cooperatives. Service is primarily concerned with assisting farmers and other cooperative groups by improving their operations.

Statistical Reporting Service: USDA: Uses research and development to improve accuracy of crop and livestock statistics by reducing sampling and nonsampling errors. Market research into preferences of household and industrial consumers affecting their purchase and use of agricultural products.

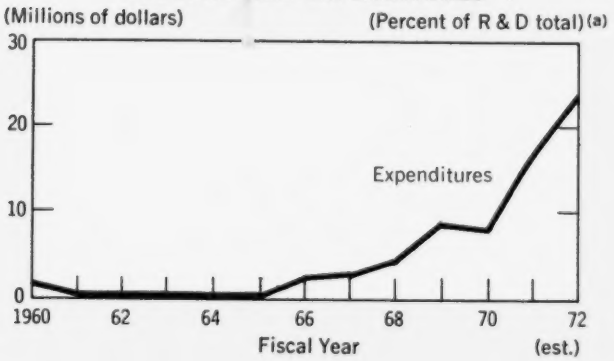
National Agricultural Library: USDA: Conducts research in computer-based information handling systems, mechanical and manual systems, communications systems, and new product development toward the long-range goal of establishing a nationwide agricultural information network.

GENERAL GOVERNMENT

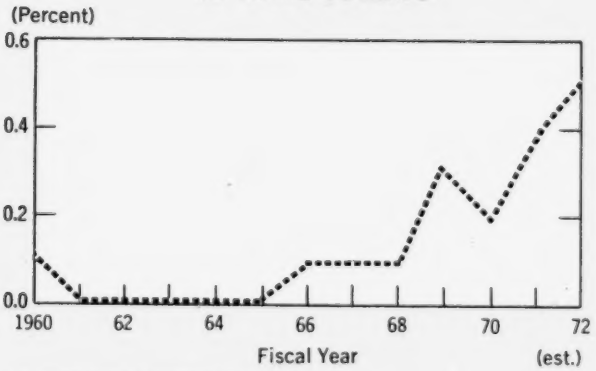
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



(a) Share was 0.1 percent for 1969-72 and less than 0.05 percent for all prior years.

SOURCES: Office of Management and Budget; National Science Foundation

GENERAL GOVERN

Total outlays and R&D ex
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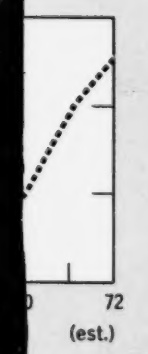
- Since 1966 R&D expenditu bly faster rates than total o 1969. In the current budget an estimated one-half of 1 1972.



nce Foundation

GENERAL GOVERNMENT

Total outlays and R&D expenditures for the general government function showed the following relative growth patterns:

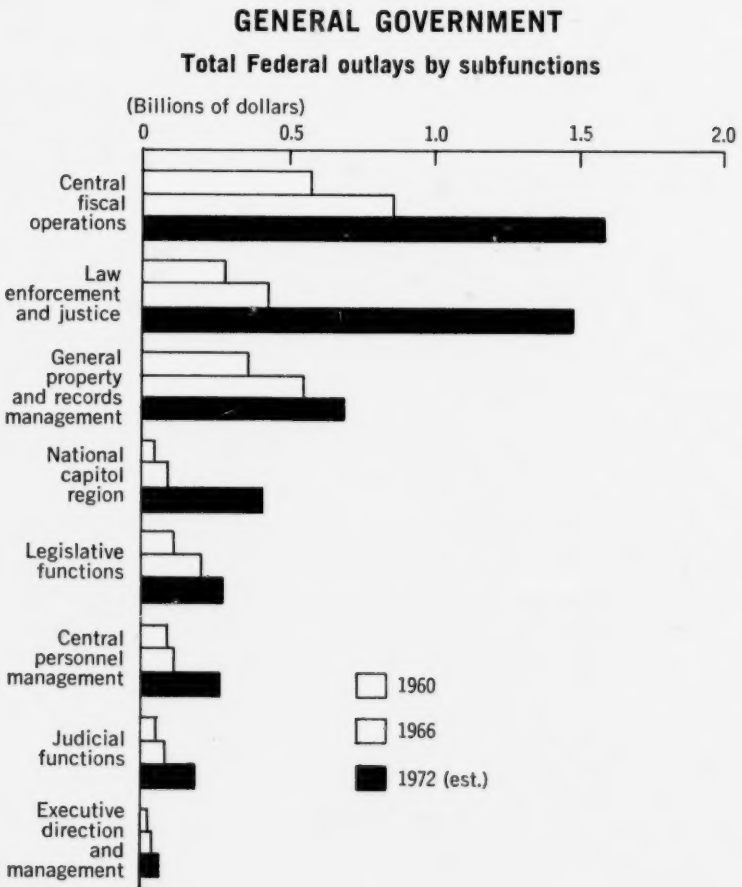
Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	9.5	9.8	31.3	13.4
Federal R&D expenditures	4.6	43.0	132.8	39.3

- Although general government is expected to account for 2 percent of total Federal outlays in 1972, its share of Federal R&D expenditures is only one-tenth of 1 percent, the smallest share of any function.

- Since 1966 R&D expenditures within this function have risen at considerably faster rates than total outlays, but they attained significant levels only in 1969. In the current budget period they show rapid gains but only represent an estimated one-half of 1 percent of total general government outlays in 1972.

Total Outlays



SOURCE: Office of Management and Budget

Nine subfunctions are encor

- Central fiscal operation
- Law enforcement and
- General property and re
- Other general governm
- National capital region
- Legislative functions
- Central personnel mana
- Judicial functions
- Executive direction and

- *Central fiscal operations* an 60 percent of total outlays in

- *Law enforcement and justi* particularly in the current on programs to provide bet administration of justice, be improve the effectiveness o for all citizens.

- Before 1970 *general prop* larger outlays than law enf crime form an important p ment outlays.

Total Outlays

Nine subfunctions are encompassed in the general government function:

- Central fiscal operations
- Law enforcement and justice
- General property and records management
- Other general government
- National capital region
- Legislative functions
- Central personnel management
- Judicial functions
- Executive direction and management

- *Central fiscal operations* and *law enforcement and justice* make up about 60 percent of total outlays in the current (1970–72) period.

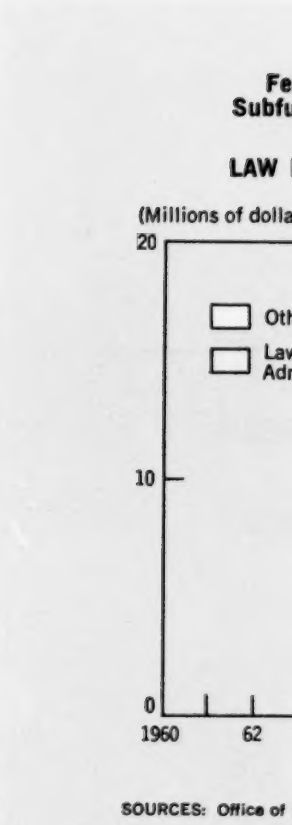
- *Law enforcement and justice* shows the largest increase since 1966 and particularly in the current (1970–72) period. Increased emphasis is placed on programs to provide better law enforcement, more prompt and efficient administration of justice, better rehabilitation of criminal offenders, and to improve the effectiveness of Federal efforts to secure equal opportunities for all citizens.

- Before 1970 *general property and records management* accounted for larger outlays than law enforcement. Expanded Federal efforts to combat crime form an important part of the upward pressure on general government outlays.

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
General government, total	$ 1.3	$ 1.7	$ 7.2	$16.8	$23.4
	Percent distribution				
Law enforcement and justice	—	—	49.9	75.9	82.4
Law Enforcement Assistance Administration (Justice)	—	—	34.2	61.5	73.1
Bureau of Narcotics and Dangerous Drugs (Justice)	—	—	10.8	8.5	6.3
Federal Bureau of Investigation (Justice)	—	—	2.7	4.7	1.9
Bureau of Prisons (Justice)	—	—	2.2	1.2	1.1
Executive direction and management	—	64.7	25.6	13.3	9.7
Office of Science & Technology	—	64.7	25.6	13.3	9.7
Central fiscal operations	15.4	23.5	8.4	5.6	3.9
Bureau of Engraving and Printing (Treasury)	15.4	23.5	8.4	5.6	3.9
Other general government	—	5.9	6.0	2.2	1.5
Advisory Commission on Intergovernmental Relations	—	5.9	6.0	2.2	1.5
General property and record management	69.2	—	6.6	1.4	1.3
General Services Administration	69.2	—	6.6	1.4	1.3
Central personnel management	15.4	5.9	3.5	1.6	1.2
Civil Service Commission	15.4	5.9	3.5	1.6	1.2
Legislative functions	—	—	—	—	—
Judicial functions	—	—	—	—	—
National capital region	—	—	—	—	—



SOURCES: Office of

Comments

- The gains registered by
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- Under *executive directio*
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1970	1971	1972
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$ 7.2	$16.8	$23.4
cent distribution		
49.9	75.9	82.4
34.2	61.5	73.1
10.8	8.5	6.3
2.7	4.7	1.9
2.2	1.2	1.1
25.6	13.3	9.7
25.6	13.3	9.7
8.4	5.6	3.9
8.4	5.6	3.9
6.0	2.2	1.5
6.0	2.2	1.5
6.6	1.4	1.3
6.6	1.4	1.3
3.5	1.6	1.2
3.5	1.6	1.2
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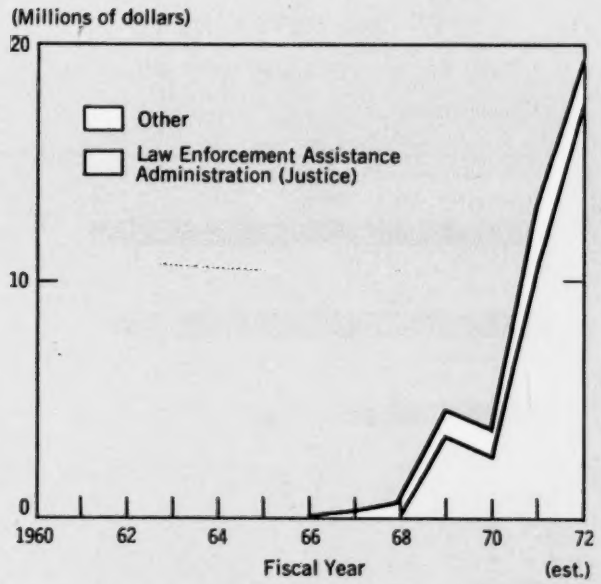
Federal R&D Expenditures by Subfunctions and Agency Programs

LAW ENFORCEMENT AND JUSTICE



SOURCES: Office of Management and Budget; National Science Foundation

Comments

- The gains registered by general government R&D work are primarily based on increasing research efforts within the *law enforcement and justice* subfunction, particularly since 1968.

  More than four-fifths of general government R&D money is currently expended on law enforcement and justice (1972). Now supported mainly by the Law Enforcement Assistance Administration, this subfunction shows a sharp rise in the 1970–72 period.

- Under *executive direction and management*, research and development are related to policymaking for the Nation's whole involvement in science.

Summary of current general government R&D programs

LAW ENFORCEMENT AND JUSTICE

Law Enforcement Assistance Administration: Justice: R&D programs on crime prevention or reduction, and enforcement of the criminal law. New knowledge and methods are sought on street crime, burglary, narcotics, violent disorder, and organized crime. Other R&D activities involve coordination of Federal agency research in crime, development of criminal law revision processes, establishment of a national criminal justice reference service, establishment of a standards and evaluation service for equipment and facilities, transfer of technology to applications within the criminal justice system, program evaluation, development of research activity by State criminal justice planning agencies and of an expanded research community in crime and criminal justice.

Bureau of Narcotics and Dangerous Drugs: Justice: Applied research includes identification of substances with a potential for abuse; development of methodologies to assess the abuse liability of drugs; studies to show the relationship between crime and drug dependent persons; patterns of drug distribution; and studies on deterrent effects of various strategies on drug use and abuse. Development work on eradication techniques.

Federal Bureau of Investigation: Justice: Development of a device that will automatically read and locate the ridge detail or minutiae contained in a fingerprint impression, coupled with a matching technique using computer-stored information.

Bureau of Prisons: Justice: Research on the effectiveness of the Narcotics Addict Rehabilitation Act, on programs for changing criminal behavior, and development of an audit system to produce indices of program effectiveness. A large-scale experiment in differential treatment has been initiated at the Robert F. Kennedy Youth Center in Morgantown, West Virginia with development efforts in the expansion and refinement of differential treatment strategies.

EXECUTIVE DIRECTION AND

Office of Science and T
policies and evaluating
technology in the interes

CENTRAL FISCAL OPERATIO

Bureau of Engraving an
security provisions and
other products, and to r
fields of inks and paper
and adhesives, and evalu
search on detection of co
Development involves d
manufacture of Bureau p

GENERAL PROPERTY AND R

General Services Admi
equipment study, constr
design, development of
transfer of underground
and frame behavior, amo

CENTRAL PERSONNEL MANA

Civil Service Commission
fications and job require
ence and training; results
research on problems in
ment.

GENERAL GOVERNMENT

Advisory Commission o
causes of intergovernmer
tration, and coordination
having intergovernmental
State-local relations.

EXECUTIVE DIRECTION AND MANAGEMENT

Office of Science and Technology: R&D activities aimed at developing policies and evaluating programs to assure effective use of science and technology in the interest of national security and the general welfare.

CENTRAL FISCAL OPERATIONS

Bureau of Engraving and Printing: Treasury: Research to improve the security provisions and quality of currency, postage stamps, bonds, and other products, and to reduce costs. Applied research conducted in the fields of inks and paper technology, formulation of new printing inks and adhesives, and evaluation of paper for currency, or substitutes. Research on detection of counterfeiting.
Development involves designing, machinery, and equipment used in the manufacture of Bureau products.

GENERAL PROPERTY AND RECORDS MANAGEMENT

General Services Administration: R&D activities in medium-voltage equipment study, construction control, building performance, cafeteria design, development of data on architectural and structural design, heat transfer of underground pipes systems, and design aspects of column and frame behavior, among others.

CENTRAL PERSONNEL MANAGEMENT

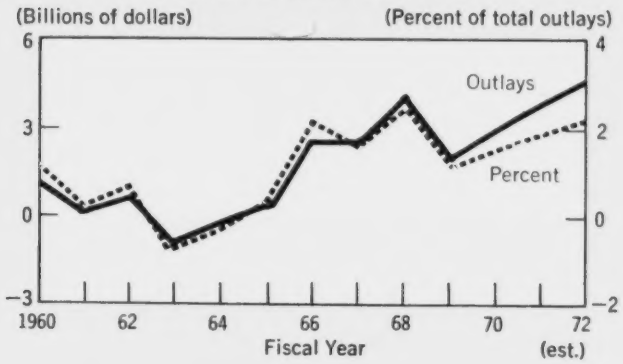
Civil Service Commission: Basic research on appraisal of personnel qualifications and job requirements. Program research on evaluating experience and training; results applied to operating programs. Applied studies research on problems in occupational analysis and personnel management.

GENERAL GOVERNMENT

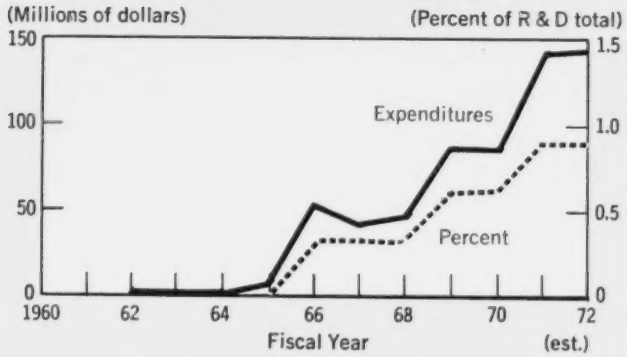
Advisory Commission on Intergovernmental Relations: Research on causes of intergovernmental tensions and conflicts; on policies, administration, and coordination of Federal and State grant and other programs having intergovernmental impact; and on emerging problems of Federal-State-local relations.

COMMUNITY DEVELOPMENT AND HOUSING

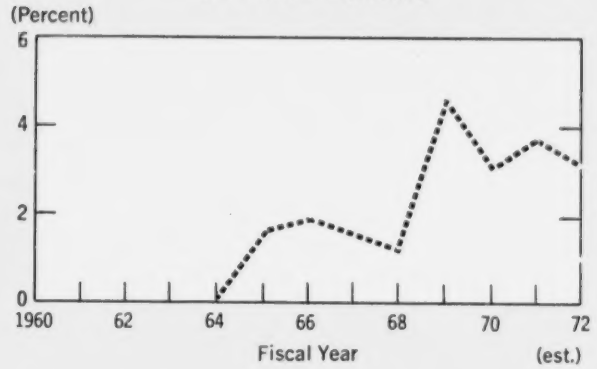
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

COMMUNI

Changes in fu
function are as fol

Total Federal outlays
Federal R&D expend

[1] Less than 0.05 perce

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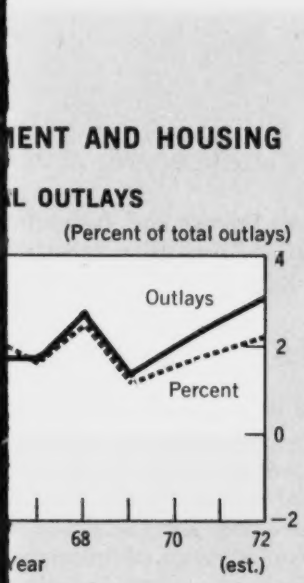
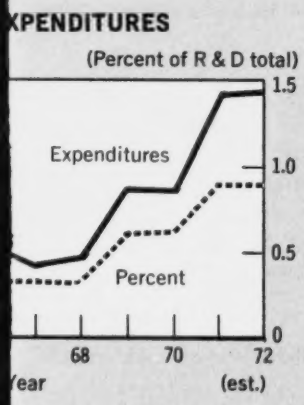
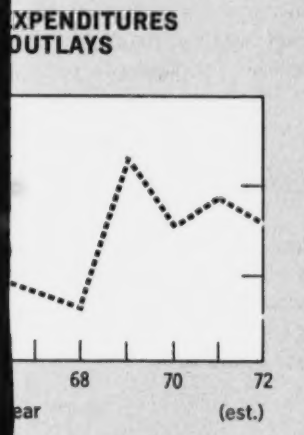






get; National Science Foundation

COMMUNITY DEVELOPMENT AND HOUSING

Changes in funding rates for the community development and housing function are as follows:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	18.2	2.9	30.1	16.5
Federal R&D expenditures	—	14.9	59.5	(1)

[1] Less than 0.05 percent.

- The preponderance of loan or loan guarantee programs within the field of community development and housing causes the data over the 1960–72 period to present a distorted view of Federal activities in this area. In 1963 and 1964, for example, repayments on loans and/or sales of mortgages exceeded disbursements and resulted in a minus in outlays for those years.

- Most of this distortion results from activities within the subfunction, maintenance of the housing mortgage market. *If outlays for this subfunction are entirely eliminated,* community development and housing shows an unbroken upward growth from 1966 to 1972 (instead of rising and falling), and the average annual growth rate becomes 33 percent instead of approximately 3 percent.

- This function is basically a growth area, reflecting increasing pressures from national housing needs and the deepening urban crisis. Federal community planning, management, and development programs show impressive growth in recent years.

- Even so, the community development and housing function accounts for a small share of total Federal outlays—approximately 2 percent in 1972.

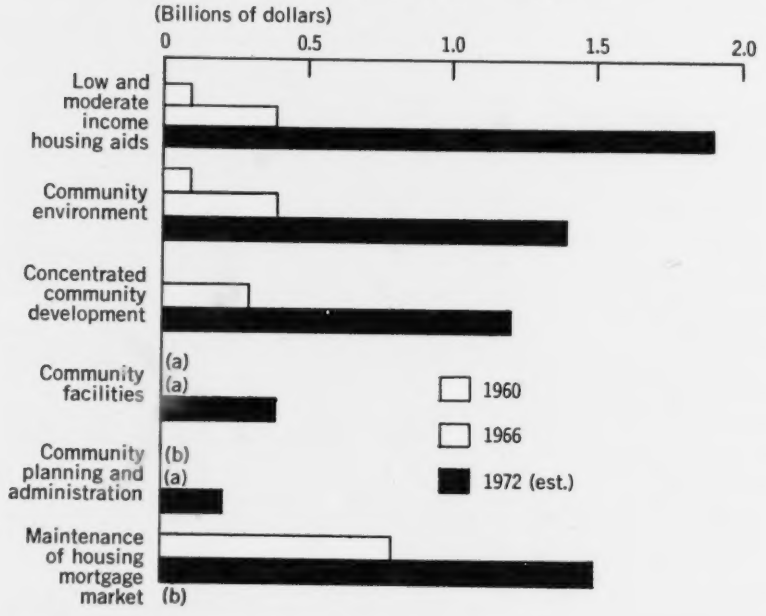
- R&D programs did not reach significant size until 1966 but have grown importantly since then. The spurt in 1971 is primarily in urban research and technology.

- As a percent of total outlays, R&D expenditures remain small, moving beyond the 4-percent level only in one year, 1969.

Total Outlays

COMMUNITY DEVELOPMENT AND HOUSING

Total Federal outlays by subfunctions



(a) Incoming receipts exceed outlays.

(b) Less than $50 million.

SOURCE: Office of Management and Budget

The community developm
functions:

- Low- and moderate-in
- Community environm
- Concentrated commu
- Community facilities
- Community planning a
- Maintenance of the ho

- Between 1960 and 1972 *lo*
munity environment each
1969. The largest increase
annual subsidy payments in

- No outlays for *concentrat*
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- In the case of *maintenanc*
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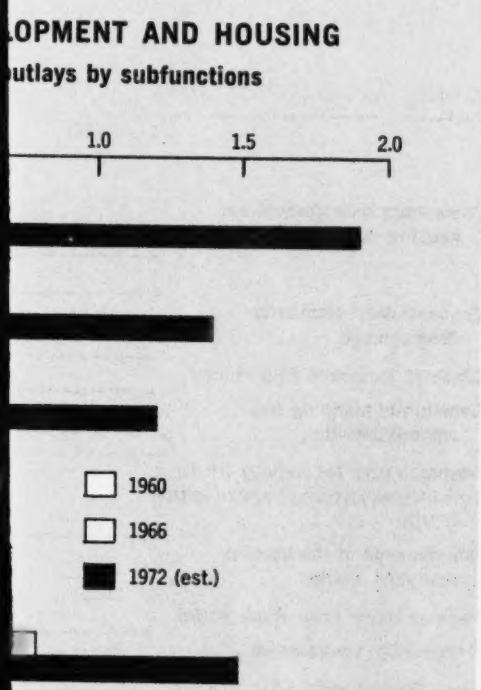


Total Outlays

The community development and housing function is made up of six subfunctions:

- Low- and moderate-income housing aids
- Community environment
- Concentrated community development
- Community facilities
- Community planning and administration
- Maintenance of the housing mortgage market

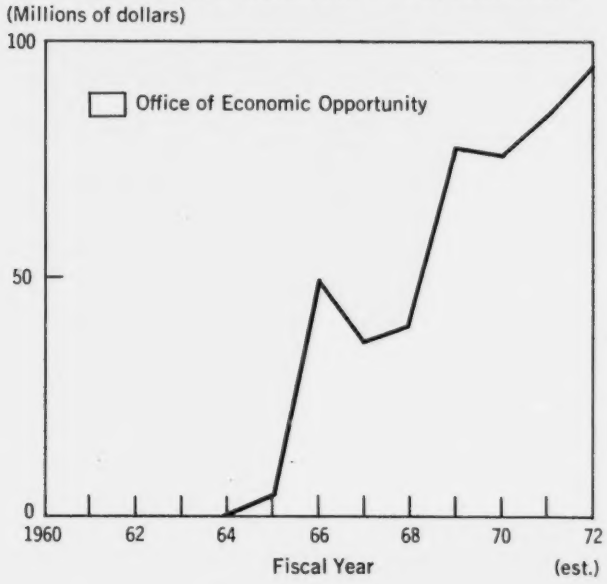
- Between 1960 and 1972 *low- and moderate-income housing aids* and *community environment* each grew 13 times, most of the gains appearing after 1969. The largest increase in 1972 is for contracts previously made for annual subsidy payments in low- and moderate-income housing.

- No outlays for *concentrated community development* were shown until 1965, but starting from a small base this subfunction shows rapid growth between 1965 and 1972. The programs under this category are principally concerned with problems of poverty.

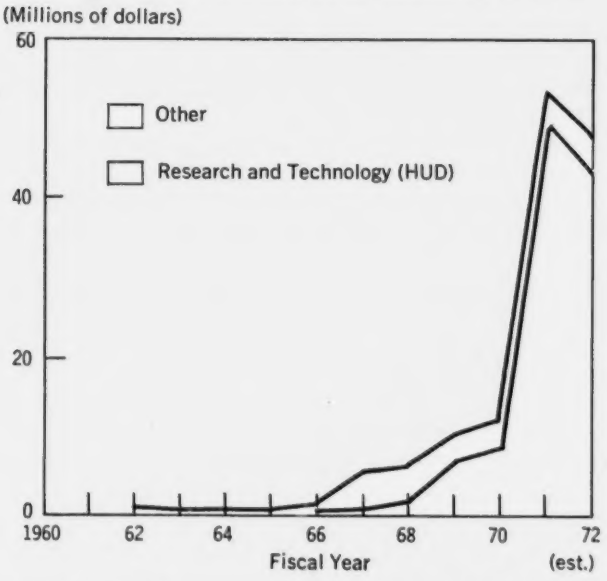
- In the case of *maintenance of the housing mortgage market* growth often does not show positively because repayments exceed new outlays in some years and thus produce a minus figure.

Federal R&D Expenditures by Subfunctions and Agency Programs

CONCENTRATED COMMUNITY DEVELOPMENT



COMMUNITY PLANNING AND ADMINISTRATION



SOURCES: Office of Management and Budget; National Science Foundation

Trends in R&D Progr

Community development and housing total .....

Concentrated community development .....

Office of Economic Opportuni

Community planning and administration .....

Research and Technology (H
Low-Income Housing Demonst
(HUD) .....

Maintenance of the housing mortgage market .....

Federal Home Loan Bank Bo

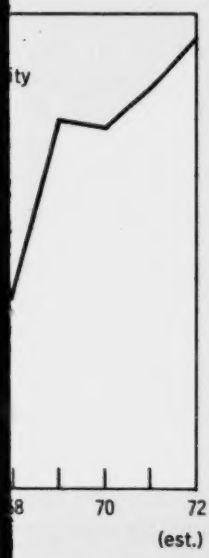
Community environment ..

Open Space Land (HUD) ....

Community facilities .....

Low and moderate income housing aids .....

ures by
Programs
DEVELOPMENT



MINISTRATION

ional Science Foundation

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Community development and housing total	$ —	$ 51.0	$ 88.8	$141.6	$141.7
	Percent distribution				
Concentrated community development	—	96.9	85.8	62.1	66.1
Office of Economic Opportunity	—	96.9	85.8	62.1	66.1
Community planning and administration	—	2.7	13.6	37.5	33.5
Research and Technology (HUD)	—	2.5	12.2	36.4	31.8
Low-Income Housing Demonstration (HUD)	—	.2	1.4	1.1	1.7
Maintenance of the housing mortgage market	—	.4	.5	.3	.4
Federal Home Loan Bank Board	—	.4	.5	.3	.4
Community environment	—	—	.1	.1	.1
Open Space Land (HUD)	—	—	.1	.1	.1
Community facilities	—	—	—	—	—
Low and moderate income housing aids	—	—	—	—	—

Comments

- *Concentrated community development* is largely made up of R&D programs for alleviation of poverty. These have shown particular growth since 1969.

  The first R&D expenditures were recorded in 1965, and since then the trend has been upward. OEO funds a fairly wide range of R&D projects, some conducted intramurally but most conducted extramurally, largely at universities and other nonprofit institutions.

  These programs cover such areas as income maintenance, rural poverty typologies, program evaluation, rural-urban migration, a longitudinal study of poverty, a study of political and social change in a large northern city, urban problems related to schools, ghettos, and indigenous control, human resources studies, Community Action demonstrations, and evaluation of VISTA projects.

- *Community planning and administration* is a growing R&D area, focused chiefly on urban research and technology in the current (1970–72) period. In 1972 urban research and technology is expected to account for almost one-third of the R&D effort in the entire community development and housing function.

  HUD's urban research and technology program reached a noticeable size in 1969 and is scheduled for much higher levels of funding in 1971 and 1972 although 1972 funding is 13 percent below the 1971 level. The bulk of the effort is in the housing area, and Operation Breakthrough within this area is HUD's major research program. Its objective is to establish self-sustaining mechanisms for producing new, marketable housing in increased volumes and for delivering it at controlled or reduced costs to people in all income levels.

Summary of current c R&D programs

CONCENTRATED COMM

Research, Developm basis for planning n equality of opportu identification of nee accepted hypotheses cepts to demonstrat these programs to agency.

COMMUNITY PLANNING

Research and Techno designed to develop tion, land use, financ develop a self-sustain marketable housing a Other contracts, gran ing housing manage ment of housing; als systems, gathering an kets, applying unive environment of comm ment capabilities to understanding of the newal.

Low-Income Housing velop and demonstra low-income persons a

MAINTENANCE OF THE

Market Studies: FHL and housing markets economic conditions cludes collection, an areas.

COMMUNITY ENVIRONM

Open Space Land: H enhance the urban en

Summary of current community development and housing R&D programs

CONCENTRATED COMMUNITY DEVELOPMENT

Research, Development, and Evaluation: OEO: R&D projects provide the basis for planning national programs to alleviate poverty and promote equality of opportunity. Include analyses of the causes of poverty, identification of need, design of social experiments, development of accepted hypotheses into working models, expanding successful concepts to demonstration scale, and developing mechanisms for moving these programs to full-scale operation either within or outside the agency.

COMMUNITY PLANNING AND ADMINISTRATION

Research and Technology: HUD: Work under Operation Breakthrough is designed to develop and test innovations in housing design, construction, land use, financing, management, and marketing. Its objective is to develop a self-sustaining mechanism for providing volume production of marketable housing at stable or reduced costs for all income groups.

Other contracts, grants, and special studies cover such areas as improving housing management and preventing the deterioration and abandonment of housing; also developing municipal and regional information systems, gathering and evaluating data on housing and mortgage markets, applying university resources to urban problems, improving the environment of communities, and strengthening State and local government capabilities to deal with urban problems; also work to increase understanding of the processes or urban growth, development, and renewal.

Low-Income Housing Demonstration: HUD: Grants are awarded to develop and demonstrate new or improved means of providing houses for low-income persons and families, including handicapped families.

MAINTENANCE OF THE HOUSING MORTGAGE MARKET

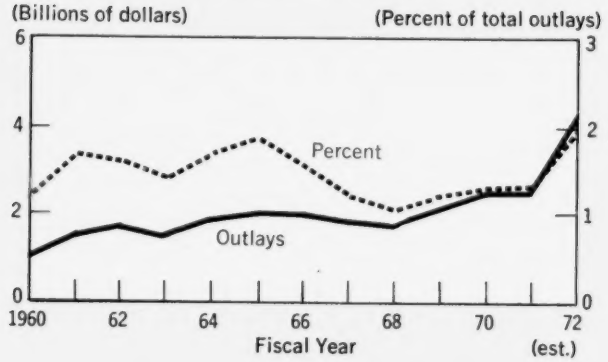
Market Studies: FHLBB: Research consists of analysis of the mortgage and housing markets, of savings and capital markets, and of general economic conditions as they relate to FHLBB responsibilities. Includes collection, analysis, and publication of financial data in these areas.

COMMUNITY ENVIRONMENT

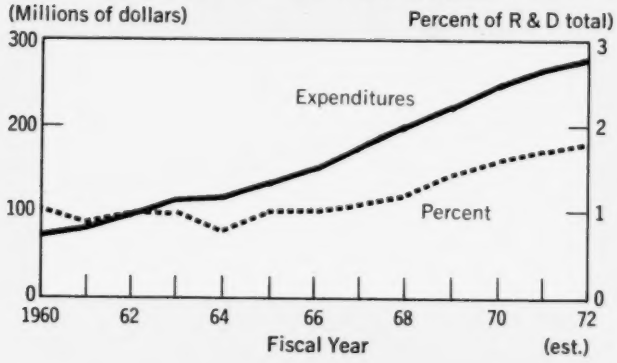
Open Space Land: HUD: Research in planning for open space land to enhance the urban environment.

NATURAL RESOURCES

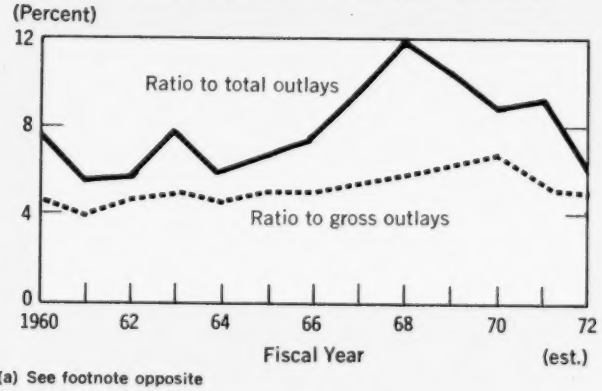
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF FEDERAL R&D EXPENDITURES TO TOTAL OUTLAYS AND TO GROSS OUTLAYS [a]



(a) See footnote opposite

SOURCES: Office of Management and Budget; National Science Foundation

NATURAL RESOU

A comparison of growth
resources is shown as follow

Av

Total Federal outlays . . . . . .
Federal R&D expenditures . . . .

- Natural resources is one
outlays, representing betw
the entire 1960–72 perio
from 1971 to 1972 of any

- This increase is largely du
public.[1] In terms of gross
from 1971 to 1972 would

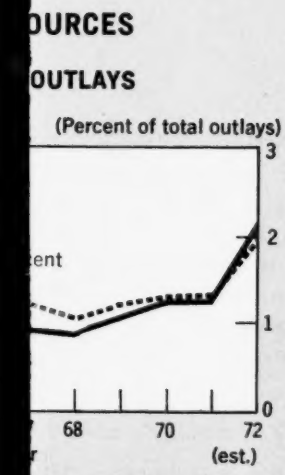
- The R&D expenditure lev
among all functions in size
resources still account for
in the current (1970–72) pe

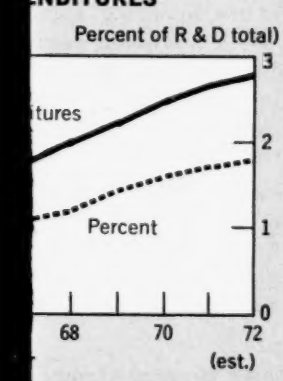
- The relatively large offset
affect the ratio of R&D ex
mated at 7 percent in 197
shows a lower but gener

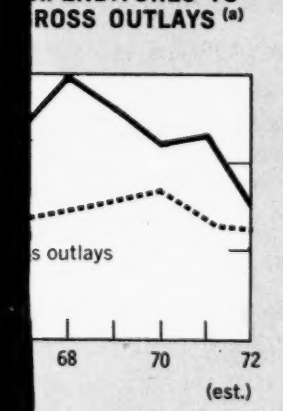
[1] Total outlays consist of gross o
from the public (lease of offshore o
power and timber). Thus, in a year
in a year when the receipts are hig
resources for the current period is a

Gross outlays (excluding receipts)
Deductions for offsetting receipts

Total outlays (including receipts







National Science Foundation

NATURAL RESOURCES

A comparison of growth in total outlays and R&D expenditures for natural resources is shown as follows:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	12.3	5.5	6.3	61.0
Federal R&D expenditures	12.7	12.9	8.8	4.4

- Natural resources is one of the smallest categories in terms of total Federal outlays, representing between 1 percent and 2 percent of the total during the entire 1960–72 period. However, it shows the largest relative growth from 1971 to 1972 of any function.
- This increase is largely due to a reduction in proprietary receipts from the public.[1] In terms of gross outlays (excluding offsetting receipts) the increase from 1971 to 1972 would be 17 percent instead of 61 percent.
- The R&D expenditure levels for natural resources place this category 6th among all functions in size of its R&D effort. But R&D expenditures in natural resources still account for only 2 percent of total Federal R&D expenditures in the current (1970–72) period.
- The relatively large offsetting receipts in the natural resources area also affect the ratio of R&D expenditures to total outlays for this function (estimated at 7 percent in 1972). The ratio of R&D expenditures to gross outlays shows a lower but generally upward trend until 1970.

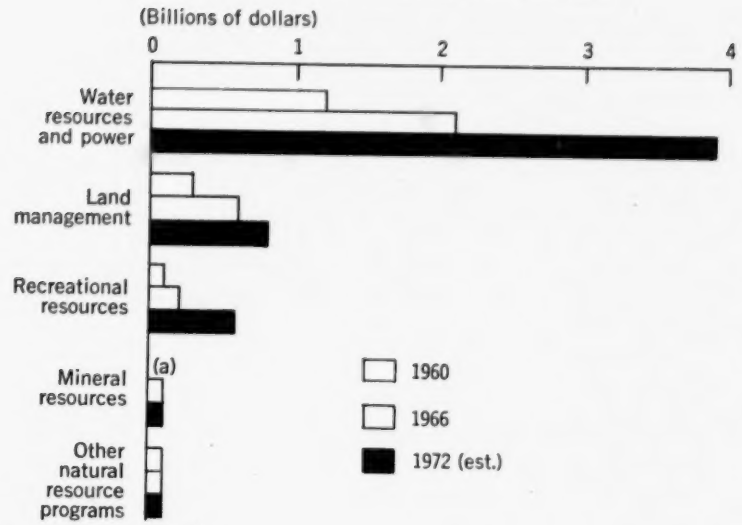
[1] Total outlays consist of gross outlays for natural resources programs minus propietary receipts from the public (lease of offshore oil rights and mineral lands, disposal of public lands, and sales of power and timber). Thus, in a year when these receipts are low, the total outlay figure is higher than in a year when the receipts are higher. A comparison of gross outlays vs. total outlays for natural resources for the current period is as follows:

	1970	*1971*	*1972*
	(Dollars in billions)		
Gross outlays (excluding receipts)	$3.6	$4.7	$5.5
Deductions for offsetting receipts	−1.1	−2.1	−1.3
Total outlays (including receipts)	2.5	2.6	4.2

Total Outlays

NATURAL RESOURCES

Total Federal outlays by subfunctions



(a) Less than $50 million.

SOURCE: Office of Management and Budget

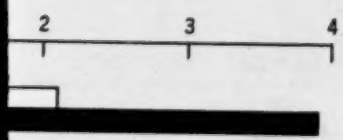
Within the natural resour

- Water resources and
- Land management
- Recreational resourc
- Mineral resources
- Other natural resour

- *Water resources and pow* percent of total outlays (for most of the dollar gr 1972 it is expected to gro programs and water and p

- *Recreational resources* al for the acquisition of Fed tion and development of p

ESOURCES
ys by subfunctions



1960

1966

1972 (est.)

Total Outlays

Within the natural resources total there are five subfunctions:

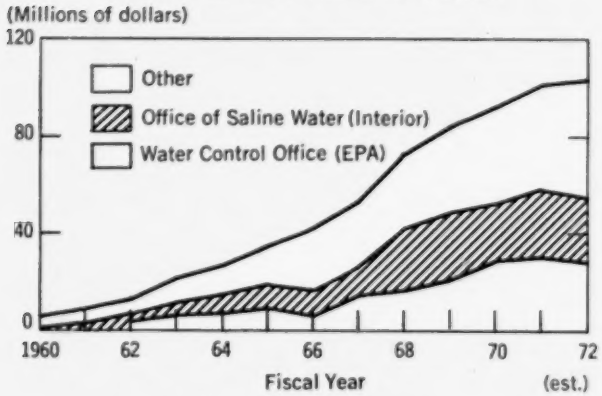
- Water resources and power
- Land management
- Recreational resources
- Mineral resources
- Other natural resources programs

- *Water resources and power* is the largest subfunction, accounting for 91 percent of total outlays (including receipts) in 1972. It also has accounted for most of the dollar growth since 1960 in the natural resources field. In 1972 it is expected to grow considerably over 1971 through waste treatment programs and water and power development programs.

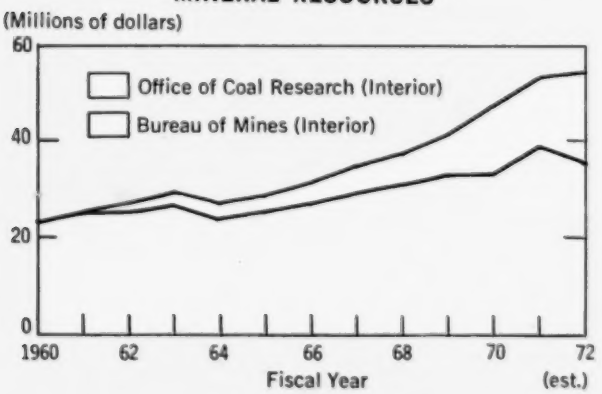
- *Recreational resources* also has notable growth planned for 1972, largely for the acquisition of Federal park lands and for grants to States for acquisition and development of parks and recreational facilities.

Federal R&D Expenditures by Subfunctions and Agency Programs

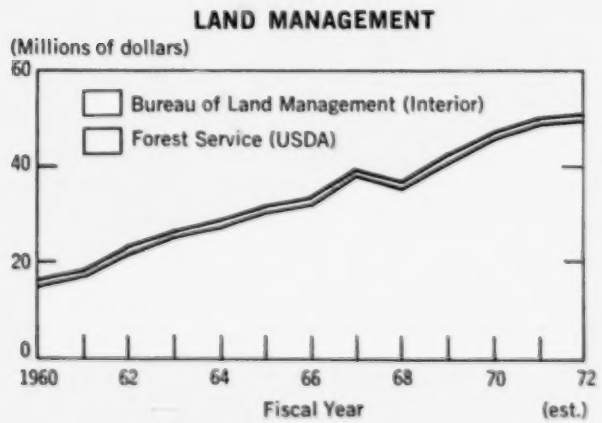
WATER RESOURCES AND POWER



MINERAL RESOURCES



LAND MANAGEMENT



SOURCES: Office of Management and Budget; National Science Foundation

Research and

Trends in R&D P

Natural resources, total

Water resources and po
Water Control Office (EP
Office of Saline Water (I
Army-Civil Functions (D
Office of Water Resource
Research (Interior) .
Tennessee Valley Author
Bureau of Reclamation
Bonneville Power Admin
(Interior) .....
Office of the Secretary
(Interior) .....

Mineral resources ...
Bureau of Mines (Interi
Office of Coal Research

Land management ....
Forest Service (Agricult
Bureau of Land Manager
(Interior) .....

Other natural resources

Geological Survey (Inter
Office of the Secretary

Recreational resources

Bureau of Sport Fisherie
Wildlife (Interior) ..
Bureau of Outdoor Recre
(Interior) .....
National Park Service (I

[1] Excludes health and saf
[2] Less than 0.05 percent.

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Natural resources, total	$ 73.6	$150.7	$244.5	$266.0	$277.7
	Percent distribution				
Water resources and power	9.6	26.8	38.2	38.2	37.3
Water Control Office (EPA)	—	4.0	12.3	11.7	10.8
Office of Saline Water (Interior)	1.6	7.4	9.5	10.2	8.8
Army-Civil Functions (DOD)	2.2	3.5	4.3	3.6	4.6
Office of Water Resources Research (Interior)	—	3.8	4.8	4.4	4.5
Tennessee Valley Authority	3.8	4.2	3.4	3.5	3.7
Bureau of Reclamation (Interior)	1.9	3.4	3.1	3.6	3.5
Bonneville Power Administration (Interior)	.1	.5	.9	1.0	1.1
Office of the Secretary (Interior)	—	—	—	.2	.4
Mineral resources	31.4	20.4	19.3	19.8	19.5
Bureau of Mines (Interior) [1]	31.4	17.8	13.7	14.4	12.8
Office of Coal Research (Interior)	—	2.7	5.6	5.4	6.7
Land management	21.1	21.6	19.0	18.5	18.1
Forest Service (Agriculture)	20.9	21.2	18.7	18.3	17.8
Bureau of Land Management (Interior)	.1	.4	.2	.3	.3
Other natural resources	24.3	18.0	16.7	16.1	17.2
Geological Survey (Interior)	24.3	18.0	16.7	16.1	17.1
Office of the Secretary (Interior)	—	—	—	—	.1
Recreational resources	13.1	13.1	6.9	7.4	8.0
Bureau of Sport Fisheries and Wildlife (Interior)	12.6	11.7	6.9	7.3	7.9
Bureau of Outdoor Recreation (Interior)	—	(2)	(2)	(2)	(2)
National Park Service (Interior)	1.0	1.4	—	—	—

[1] Excludes health and safety research in mining.
[2] Less than 0.05 percent.

Comments

- All of the atomic energy outlays are included under the atomic energy subfunction of national defense. However, approximately one-half of atomic energy R&D expenditures are considered to be primarily non-defense-oriented. A major portion of these expenditures, particularly for the reactor development program, could be considered as part of the natural resources function. If these funds were included here, R&D expenditures for natural resources would more than double.

- *Water resources and power* is expected to represent 37 percent of total natural resources R&D expenditures in 1972, the largest share; it held the smallest share in 1960. However, its R&D share for 1972 is much less than its share of the natural resources outlays total.

  R&D expenditures for water pollution control and abatement by the Environmental Protection Agency, or its predecessor agencies, showed a very large increase in the 1966–70 period but an almost constant level of fur ding in the current period.

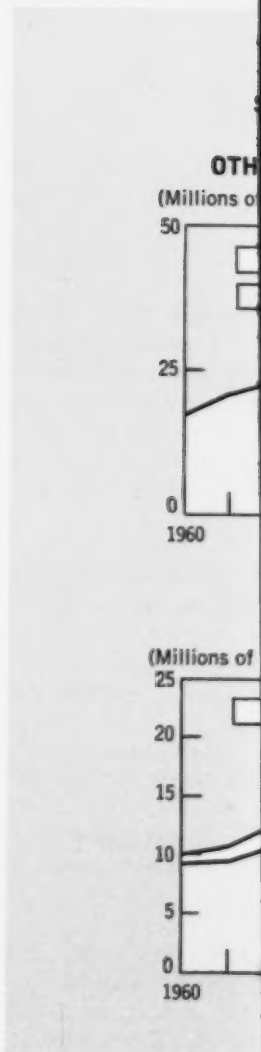
  R&D expenditures aimed at developing methods of converting saline water to fresh water in order to help meet the expanding demand for clean and adequate water supplies show a similar pattern.

  The other water resources and power R&D programs, although small, increased sharply between 1960 and 1970 but have shown less tendency to increase since 1970.

- The Bureau of Mines was the sole source of expenditures for *mineral resources* research and development until 1962 when the Office of Coal Research was established. The R&D effort of the Bureau of Mines is still responsible for most of the R&D component of the mineral resources area.

  The decrease in 1972 for the Bureau of Mines is primarily due to the transfer of the methane drainage program from the mining research program to the health and safety research activity.

- Within *land management* the Forest Service has always dominated the R&D effort. Within natural resources it represents 18 percent of the 1972 total.



SOURCES: Offi

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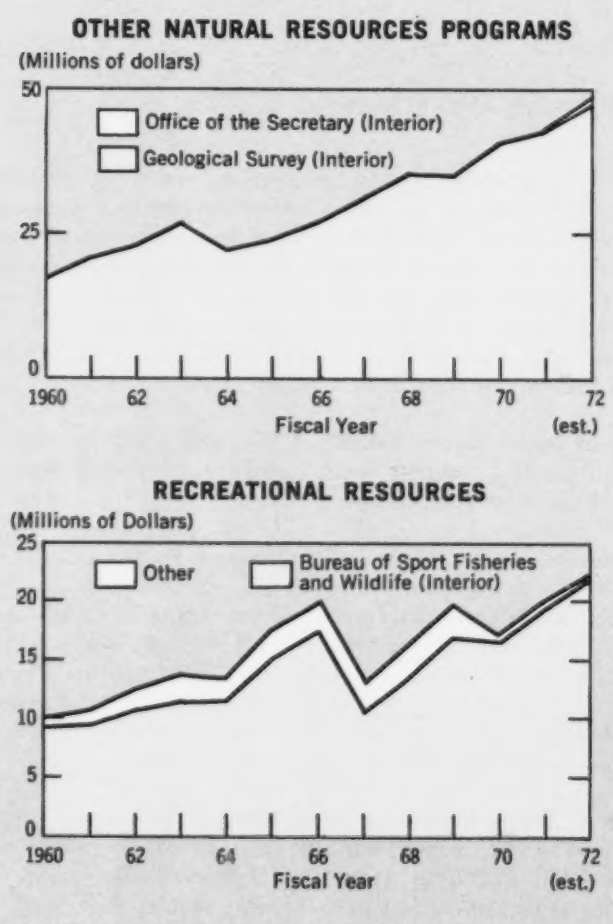
Federal R&D Expenditures by Subfunctions and Agency Programs



SOURCES: Office of Management and Budget; National Science Foundation

- R&D expenditures in the *other natural resources* subfunction consist almost entirely of activities of Interior's Geological Survey.

- R&D expenditures doubled in *recreational resources* in 1960–72.

WATER RESOURCES AND POWER

Water Control Office: EPA: Development of practicable measures to determine causes of pollution and to control or prevent pollution. Grants and contracts made to various performers to test and illustrate applicability of research findings and newly developed techniques related to industrial waste problems, sewer problems, advanced waste treatment, water purification, and joint treatment of municipal and industrial wastes. Balance is research in own laboratories, field studies, and demonstrations and technical management.

Office of Saline Water: Interior: R&D work on low-cost processes for converting saline water to fresh water in quality suitable for municipal, industrial, and agricultural uses.

Department of the Army-Civil Functions: DOD: Coastal engineering R&D studies on physical phenomena, basic principles and control measures for shore protection and improvement. Civil works investigations toward better procedures to analyze hydrologic and engineering data, refine design methods, develop better materials. Mississippi River Basin model to improve operation of the reservoir system. Hydrologic studies to provide basic data for water control structures. Joint research program with AEC on nuclear explosives for civil construction.

Office of Water Resources Research: Interior: Grants, contracts, and other arrangements with educational institutions, private foundations, private firms, and individuals, and with local, State, and Government agencies to undertake research in water problems deemed desirable to study and not otherwise being studied.

Tennessee Valley Authority: R&D work to aid in unified development of resources of the Tennessee Valley region; to develop and test fertilizers; to improve TVA operations.

Bureau of Reclamation: Interior: New areas explored toward greater utilization of water, more efficient distribution and use, protection of

quality, greater economy i
sources projects.

Bonneville Power Administra
entific knowledge toward in
of the Bonneville Power Syst

MINERAL RESOURCES

Bureau of Mines: Interior:
coal utilization technology,
methods of converting coa
methods to manage coal was
Petroleum research is devote
gas and greater efficiency i
ergy resources. Attention is
developing new uses and pr
environment by identifying
1972 budget provides for i
the problems and potentials
tion underground.

Oil shale research is condu
policy. Of particular interest
shale; dealing with disposal
of kerogen and shale oil.

New processes are sought t
fabricate, and recycle met
budget provides for expansi
other solid waste-related rese

Mining research is conducte
through technological adva
ments.

Explosives and explosions re
information and guidance to
handling; safety characteristi
uids and gases and potentiall

Resource development inc
programs and systems, econo

Office of Coal Research: Int

quality, greater economy in planning and management of water resources projects.

Bonneville Power Administration: Interior: Systematic application of scientific knowledge toward improving the planning, design, and operation of the Bonneville Power System within the northwest power grid.

MINERAL RESOURCES

Bureau of Mines: Interior: Coal research is directed toward advancing coal utilization technology, developing economic and more efficient methods of converting coal to cleaner energy forms, and improving methods to manage coal wastes and reduce coal-related pollutants.

Petroleum research is devoted to providing more petroleum and natural gas and greater efficiency in the extraction and utilization of these energy resources. Attention is directed to increasing the resource base; developing new uses and products from oil and gas; and improving the environment by identifying and combatting the causes of pollution. The 1972 budget provides for initiation of a research program to evaluate the problems and potentials of disposing of industrial wastes by injection underground.

Oil shale research is conducted to help establish a national oil shale policy. Of particular interest are *in situ* techniques for retorting ungraded shale; dealing with disposal of wastes; chemical and physical properties of kerogen and shale oil.

New processes are sought through research to extract, recover, purify, fabricate, and recycle metallic and nonmetallic minerals. The 1972 budget provides for expansion of urban refuse separation research and other solid waste-related research.

Mining research is conducted to develop improved extractive systems through technological advancement of fundamental subsystems elements.

Explosives and explosions research is conducted to provide technologic information and guidance to government agencies and industry on safe handling; safety characteristics; hazards associated with flammable liquids and gases and potentially explosive chemicals.

Resource development includes the conduct of mineral statistical programs and systems, economic analysis, and data development.

Office of Coal Research: Interior: Contracts for research and develop-

ment of new and more efficient methods of mining, preparing, and utilizing coal. This office is responsible for developing the full potentiality and versatility of coal as the Nation's largest energy resource. The aspect of insuring a clean environment while minimizing or eliminating pollution-causing energy products is an important consideration. The office seeks to expand the use of coal through development of new uses as well as within presently known fields of utilization.

LAND MANAGEMENT

Forest Service: Agriculture: Studies are conducted to maintain a sustained yield of products at least cost; improve forage and habitat for livestock and wildlife without damage to soil, watershed, or other values; assure maximum regular flow of usable water and reduce floods; improve methods for developing and managing recreation resources.
Research is conducted to develop measures for the protection of forests from damage by fire, insects, and diseases.
Studies are also conducted to develop new and improved forest products, reduction and utilization of waste, and use of low-quality wood and less-desirable species. Research is also conducted to advance the mechanization and efficiency of forestry operations.
Investigations are conducted to inventory and appraise the condition of forest lands, volume and quality of standing timber, ownership, annual growth and depletion, potential for timber products, and the economics and marketing potential of forest crop production.

Bureau of Land Management: Interior: R&D program relating to watershed conservation and development, to timber production, livestock forage production, and wildlife habitat and production.

OTHER NATURAL RESOURCES

Geological Survey: Interior: Research to define the geological structure of the Nation; to determine its mineral and water resources, and to delineate the physical characteristics of the country. Activities include the Earth Resources Observation Satellite (EROS) program of orbital remote-sensing research and data application; geologic and mineral resource surveys and mapping; water resources investigations to provide facts as a basis for rational water use, development, and planning.

RECREATIONAL RESOURCES

Bureau of Sport Fisheri
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including study of fac
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development of metho
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wildlife management an

Bureau of Outdoor Rec
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e geological structure
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try. Activities include
program of orbital re-
logic and mineral re-
estigations to provide
and planning.

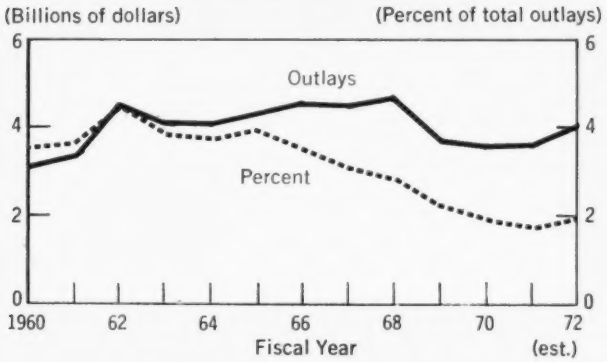
RECREATIONAL RESOURCES

Bureau of Sport Fisheries and Wildlife: Interior: Research to gain information needed for improved methods of sport fishery management, including study of factors governing sport fishery productivity, more efficient production of hatchery fish, effects of pesticides on fish, and development of methods of controlling fish that are pests. Research on game and nongame, resident and migratory forms of wildlife to improve wildlife management and conservation practices.

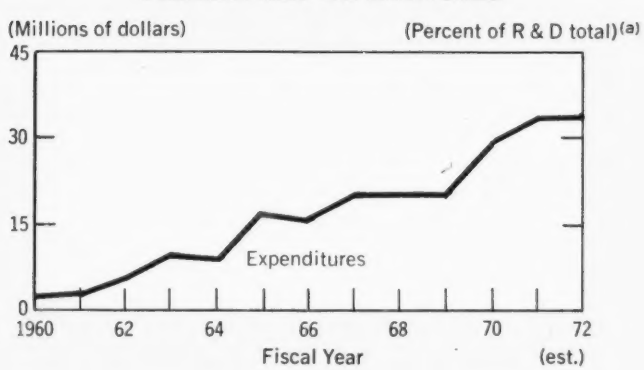
Bureau of Outdoor Recreation: Interior: Research studies and reports on factors and conditions relating to current and future outdoor recreation purposes, uses, and needs.

INTERNATIONAL AFFAIRS AND FINANCE

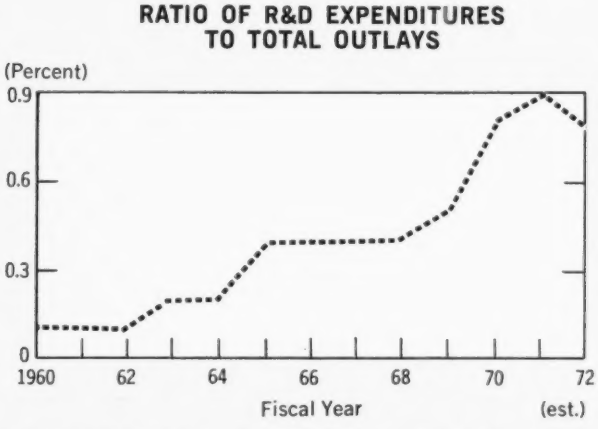
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



(a) Less than 0.05 percent from 1960 to 1962, 0.06 percent to 0.1 percent from 1962 through 1969, and 0.2 percent from 1970 through 1972.

SOURCES: Office of Management and Budget; National Science Foundation

INTERNATIONAL AFF

Total outlays and R&D expen
show the following rates of chang

	Average a
Total Federal outlays	
Federal R&D expenditures	

[1] Less than 0.05 percent.

- International affairs and financ
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the Federal total—comprising

- Total Federal outlays for intern
percent in the 1960–72 perio
R&D spending within this fun
still insignificant in terms of t
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- The ratio of R&D expenditures
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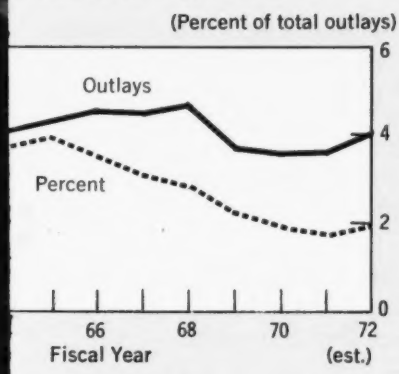
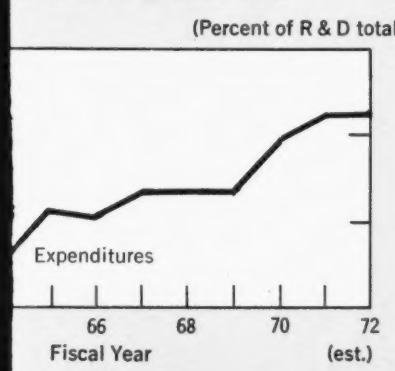
AL AFFAIRS AND FINANCE

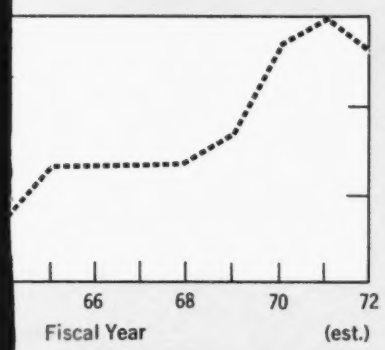
L FEDERAL OUTLAYS



AL R&D EXPENDITURES



OF R&D EXPENDITURES TOTAL OUTLAYS



m 1960 to 1962, 0.06 percent to 0.1
59, and 0.2 percent from 1970 through 1972.

ment and Budget; National Science Foundation

INTERNATIONAL AFFAIRS AND FINANCE

Total outlays and R&D expenditures for international affairs and finance show the following rates of change:

	Average annual percent change			
	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	6.6	— 5.6	.4	12.4
Federal R&D expenditures	40.0	15.8	14.0	(1)

[1] Less than 0.05 percent.

- International affairs and finance is one of the smaller functions in terms of Federal outlays. Since 1962 it has also accounted for a declining share of the Federal total—comprising just under 2 percent in 1972.

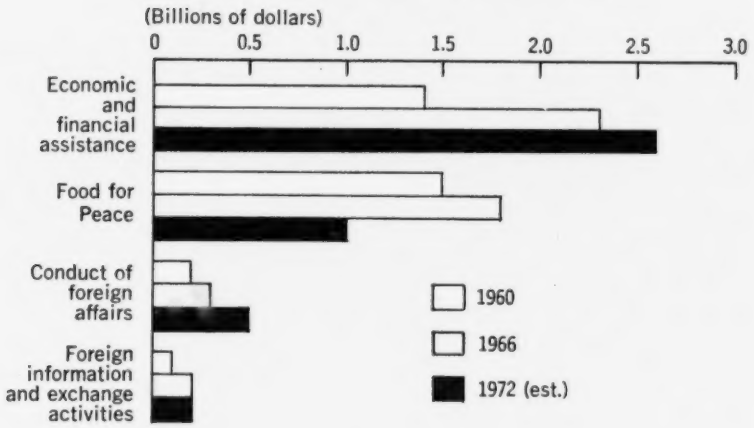
- Total Federal outlays for international affairs and finance have risen only 32 percent in the 1960–72 period and have declined since 1968. Federal R&D spending within this function has multiplied 15 times, although it is still insignificant in terms of total Federal R&D expenditures—just an expected two-tenths of 1 percent of the total in 1972.

- The ratio of R&D expenditures to total outlays increased moderately up to 1968, but grew sharply from 1968 to 1971 and declined somewhat in 1972. Efforts to solve overpopulation problems and promote economic development in other nations have accounted for the rising R&D curve. Nonetheless, R&D programs are still less than 1 percent of outlays.

Total Outlays

INTERNATIONAL AFFAIRS AND FINANCE

Total Federal outlays by subfunctions



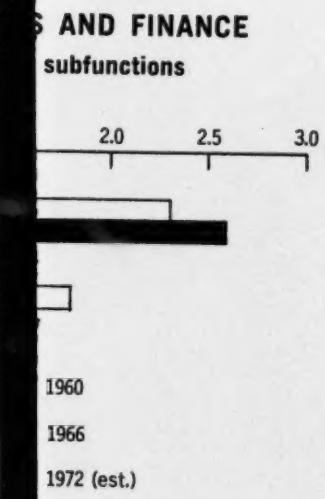
SOURCE: Office of Management and Budget

Four subfunctions are

- Economic and fi
- Food for Peace
- Conduct of forei
- Foreign informat

- *Economic and financ* about 90 percent of these two subfunctio nomic and financial for international affai

Economic and finan friendly countries in and defense, and de through the World assistance is increasin



Total Outlays

Four subfunctions are included in international affairs and finance:

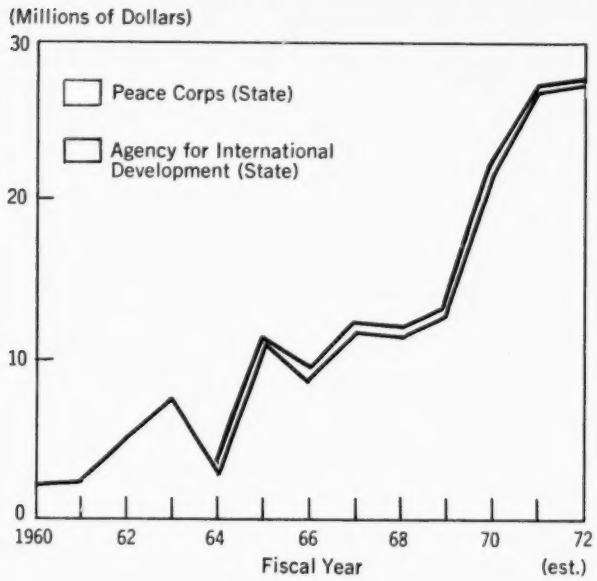
- Economic and financial assistance
- Food for Peace
- Conduct of foreign affairs
- Foreign information and exchange activities

- *Economic and financial assistance* and *Food for Peace* have accounted for about 90 percent of total outlays throughout the 1960–72 period. While these two subfunctions claimed fairly equal shares in earlier years, economic and financial assistance will receive 60 to 65 percent of the outlays for international affairs in the current period.

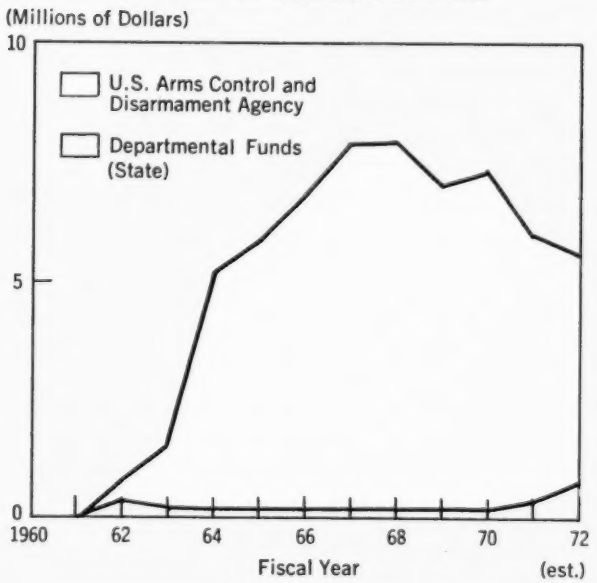
Economic and financial assistance covers security assistance, to assist friendly countries in taking primary responsibility for their internal security and defense, and development assistance, which covers funds channeled through the World Bank and regional development banks. Development assistance is increasing in 1972.

Federal R&D Expenditures by Subfunctions and Agency Programs

ECONOMIC AND FINANCIAL ASSISTANCE



CONDUCT OF FOREIGN AFFAIRS



SOURCES: Office of Management and Budget; National Science Foundation

Trends in R&D Programs

	19
International affairs and finance, total	$
Economic and financial assistance	9
Agency for International Development (State)	9
Peace Corps (State)	
Conduct of foreign affairs	
U.S. Arms Control and Disarmament Agency	
Departmental Funds (State)	
Foreign information and exchange activities	
U. S. Information Agency	

[1] Less than 0.05 percent.

by
grams

ISTANCE

AIRS

Science Foundation

Research and Development

Trends in R&D Programs

	1960	1966	1970	1971	1972
	(Dollars in millions)				
International affairs and finance, total	$ 2.2	$16.3	$29.3	$33.4	$33.4
	Percent distribution				
Economic and financial assistance	95.5	57.1	74.4	81.4	82.9
Agency for International Development (State)	95.5	54.0	73.0	80.8	82.3
Peace Corps (State)	—	3.1	1.4	.6	.6
Conduct of foreign affairs	(1)	41.7	24.7	18.0	16.5
U.S. Arms Control and Disarmament Agency	—	41.1	24.6	17.1	14.4
Departmental Funds (State)	(1)	.6	.3	.9	2.1
Foreign information and exchange activities	4.5	1.2	.7	.6	.6
U. S. Information Agency	4.5	1.2	.7	.6	.6

[1] Less than 0.05 percent.

Comments

- Most of the growth in R&D expenditures has been based on activities in *economic and financial assistance*. R&D programs for this subfunction have increased thirteenfold since 1960.

  Rising R&D funding has been a result of increasing AID programs, with particular emphasis in the current period on population and family planning problems.

- Cutbacks in the U. S. Arms Control and Disarmament Agency's R&D effort since 1968 have caused a downward trend for the *conduct of foreign affairs* subfunction. ACDA provided 41 percent of the R&D money in the international affairs and finance function in 1966; its share is expected to fall to 14 percent in 1972.

- R&D spending for *foreign information and exchange activities* reached a peak of $0.7 million in 1965 and has since dropped back to 1960–63 levels.

Summary of curre
R&D programs

ECONOMIC AND FIN

Agency for Inter
health, populatio
search on high-y
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eradication, nutri
opment efforts di

Peace Corps: Stat
unteers and staff,
of methodology

CONDUCT OF FORE

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FOREIGN INFORMATI

U.S. Information
affecting radio sig
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system performan
hazards from exp
tions.

Summary of current international affairs and finance R&D programs

ECONOMIC AND FINANCIAL ASSISTANCE

Agency for International Development: State: Research on agriculture, health, population/family planning, and nutrition and child feeding. Research on high-yield wheat, rice, and corn, and on high-protein food productivity. Other R&D projects include work on malaria immunity and eradication, nutrition additives, and livestock disease eradication. Development efforts directed to utilization of high-[illegible] crops.

Peace Corps: State: Research aimed at recruiting, selecting, training volunteers and staff, and evaluating their performance. Also, development of methodology for determining effectiveness of overseas projects.

CONDUCT OF FOREIGN AFFAIRS

U.S. Arms Control and Disarmament Agency: External research contracts directed to technical aspects of arms control. Also research also drawn from other agencies to gain detailed understanding of the nature of strategic weapons systems. Research to inspection systems for detecting the presence of nuclear weapons and upgraded offensive missile performance characteristics. Research on indicators to verify the destruction of chemical and biological weapons. Research directed to nuclear safeguards. Research additionally covers economic aspects of defense spending, the pattern of arms trade, control of local conflict, and the relation of political environment to arms control.

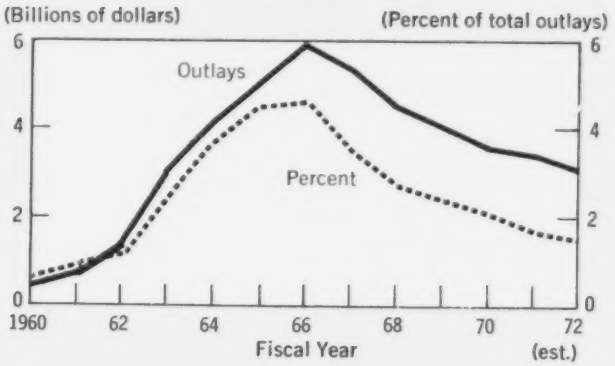
Departmental funds: State: Research draws relevant findings from studies in the social sciences. Funds also used to stimulate research on policy questions, to draw upon foreign policy consultants, and to guide and encourage cooperative planning among Government agencies sponsoring contract research on foreign areas and international relations.

FOREIGN INFORMATION AND EXCHANGE ACTIVITIES

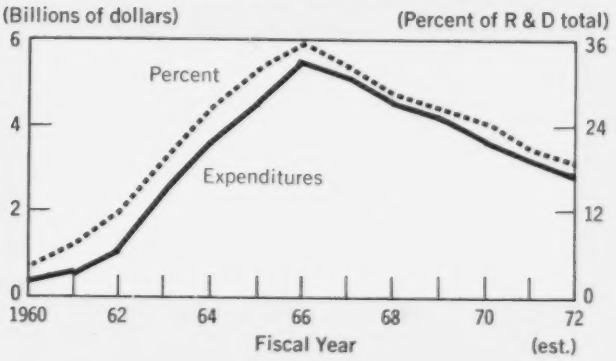
U.S. Information Agency: Research conducted on natural phenomena affecting radio signals and on development of equipment and techniques to improve quality of broadcasting. Projects include predicting long-term system performance over Voice of America circuits and potential health hazards from exposure to high-level electromagnetic fields at relay stations.

SPACE RESEARCH AND TECHNOLOGY

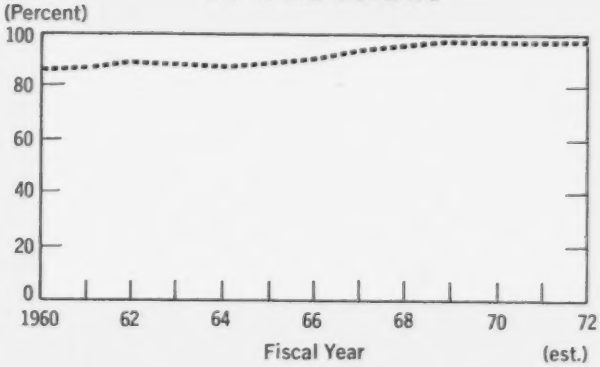
TOTAL FEDERAL OUTLAYS



FEDERAL R&D EXPENDITURES



RATIO OF R&D EXPENDITURES TO TOTAL OUTLAYS



SOURCES: Office of Management and Budget; National Science Foundation

SPACE RESEARC

National Aeronautic
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selected time periods a

Total Federal outlays ...
Federal R&D expenditures

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- The patterns of char
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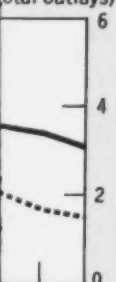
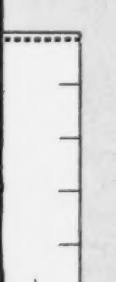


R & D total)



Foundation

SPACE RESEARCH AND TECHNOLOGY

National Aeronautics and Space Administration outlays make up this function. The entire activities of this agency are considered as either research and development or support of research and development. Funding changes for selected time periods are as follows:

Average annual percent change

	1960–66	1966–70	1970–71	1971–72
Total Federal outlays	56.5	−10.9	−10.2	− 6.5
Federal R&D expenditures	57.8	− 8.8	−10.2	− 6.3

- Total outlays and R&D expenditures for space research and technology differ only by outlays for construction of facilities (R&D plant), which represent less than 2 percent of total outlays in the current period. In past years the difference has been somewhat greater but never more than 14 percent.

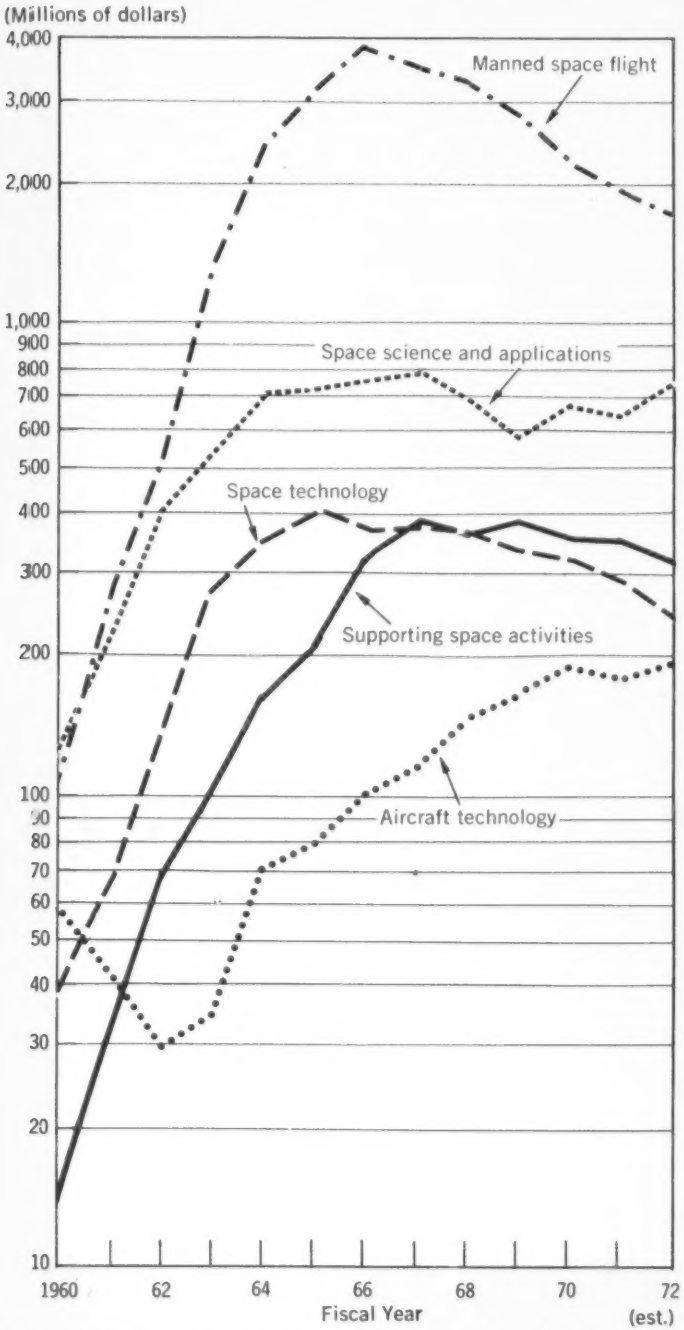
- The patterns of change for total outlays and R&D expenditures for this function are, thus, close in all periods, especially in the current one.

- Space research and technology showed very rapid growth between 1960 and 1966 (hitting a high point in 1966). It has since declined both in terms of spending levels and in its share of total Federal outlays and share of total Federal R&D expenditures.

- In the 1960–66 period, much of the developmental work necessary for the manned lunar landing was accomplished. Thereafter the space total began to decline. The first moon landing occurred in 1969. Currently the total space function is being funded at a much lower level than in previous years with continued reduction in manned space flight and space technology but some increases in space science and applications and in aircraft technology.

SPACE RESEARCH AND TECHNOLOGY

Federal R&D expenditures by functions



SOURCES: Office of Management and Budget; National Science Foundation

AND TECHNOLOGY

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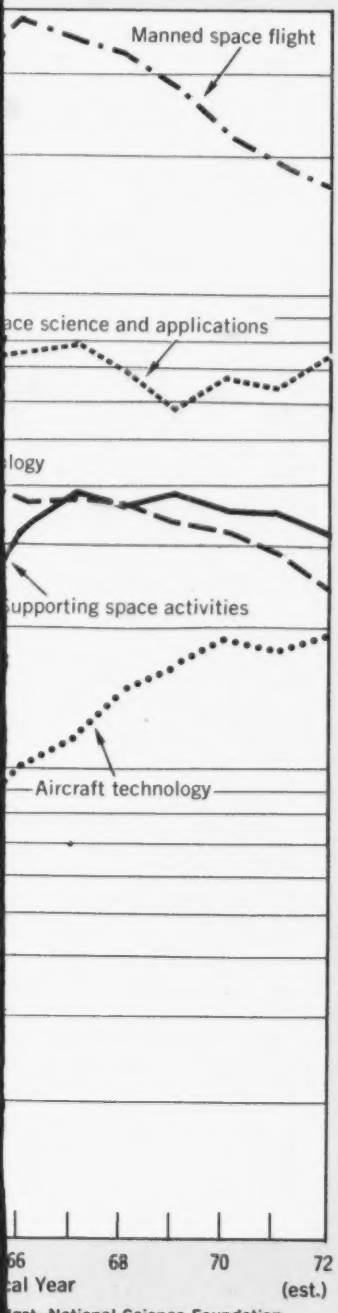

get; National Science Foundation

Research and Development

Trends in R&D Programs

Distribution of Federal R&D expenditures for space research and technology, by subfunction

	1960	1966	1970	1971	1972
	(Dollars in millions)				
Space research and technology, total	$ 346.6	$5,360.6	$3,698.8	$3,318.9	$3,109.4
	Percent distribution				
Manned space flight	32.7	71.2	59.3	56.6	53.0
Space science and applications	35.3	14.1	17.5	18.9	23.3
Supporting space activities	4.2	6.0	9.7	10.5	10.1
Space technology	11.3	6.8	8.5	8.6	7.5
Aircraft technology	16.6	1.9	4.9	5.4	6.1

Comments

- *Manned space flight* has been the most heavily funded subfunction throughout the period 1960–72. Funds grew rapidly between 1960 and 1966 and reached a peak in 1966. The Mercury and Gemini programs (precursors to Apollo) and the extensive developmental efforts necessary for the Apollo flight and landing on the moon accounted for nearly all of the expenditures during the 1960–66 period. Since then funds for manned space flight have shown a continuous decline, both in terms of actual expenditures and in their share of the total space research and technology function. Between 1966 and 1970 manned space flight had the largest relative decline of the five subfunctions.

  During the current period increasing emphasis is being placed on R&D efforts aimed at development of earth orbital workshops, space stations, and a space shuttle vehicle, all of which are necessary for future manned space operations in earth orbit. Three additional Apollo lunar missions are planned to follow Apollo 14, completed in January 1971.

- The funding pattern for *space science and applications* from 1960 to 1969 was similar to that of manned space flight—very rapid growth and then rapid decline. However, in the current period this subfunction shows renewed growth. Under *space science* and area of increasing R&D effort is lunar and planetary exploration. Included are unmanned missions of Mariner spacecraft to Mars, Venus, and Mercury. Also included are missions of the Pioneer F and G spacecraft to provide observations and measurements of the solar system beyond Mars to the vicinity of Jupiter. Additionally included are R&D efforts directed toward development of an outer planet spacecraft for the Grand Tour unmanned missions of the outer planets in the late 1970's.

- The *space applications* program is also showing an increase in funding during the current period. This program seeks to apply the knowledge gained from space flights to such areas as meteorology, earth resources, geodesy, communications, and navigation.

- Funding of the *space technology* subfunction has shown a constant decline since 1965 after a very rapid growth period. Reduction in funding of the development of the NERVA nuclear engine in the current period has caused an even sharper decline than in the years from 1966 to 1970.

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- *Aircraft technology* is the only component of space research and technology that has a completely different funding pattern than the overall function or the other subfunctions. After a decline in the years 1960 to 1962, aircraft technology has shown continuous growth. R&D activities include work with other Federal agencies (DOD and DOT) to provide advanced technology for the development of subsonic, supersonic, and hypersonic aircraft for both civil and military uses.

- As the overall space effort has been reduced, the need for *supporting space activities* has also declined. In the current period, the number of tracking stations has been reduced as have requirements for ships, aircraft, and communications support.

Summary of current space research and technology R&D programs

Manned Space Flight: NASA: The Apollo flights to the moon have as their goal the study of the moon and its relation to the earth and the solar system, and an understanding of the evolutionary history of earth and the dynamic processes that continue to transform it.

Development of an experimental orbital space workshop designed to conduct astronomical studies of the sun; study the application of space in surveying and monitoring the resources and environmental interaction of the earth; and to study the biomedical effects of long-duration flight on man.

Development of a space shuttle for future space operations in earth orbit; the shuttle will be a reusable space vehicle to transport men and equipment to and from earth orbit.

Research and study of space station modules and support requirements of men in space. The space station will be a continuously operating platform for diversified scientific applications and technology experiments encompassing nearly all scientific disciplines.

Space Science and Applications: NASA: Research on the space environment, of the earth and sun, and the relationship of these bodies to each other and to interplanetary space, other stars, galaxies, and nebulae, utilizing ground-based observatories, aircraft, balloons, sounding rockets, and spacecraft.

Development of advanced Orbiting Solar Observatories and an Orbiting Astronomical Observatory.

Exploration of the moon, planets, and other bodies in the solar system by ground-based observation and automated spacecraft.

Research and design of the Viking spacecraft series for exploration of Mars.

Development of an outer planet spacecraft for long-duration and multiple missions in the late 1970's.

Launching of an experimental Earth Resources Technology Satellite to test the spacecraft and sensors which may be required for a system to survey the earth's resources from space; development of advanced satellite capabilities in communications, navigation, geodesy, and meterology.

Space Technology: N
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Engine for Rocket Veh

Supporting Space Ac
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for future space operations in earth
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applications and technology experi-
ntific disciplines.

NASA: Research on the space environ-
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Space Technology: NASA: Research on laser communications and on reliable, long-life and high speed/density components for space electronics systems. Research on production of electronic power in space and development of high specific impulse propulsion systems.
Research in the areas of thermal protection, aerothermodynamics, configuration development, entry technology, and long-life time componentry for the space shuttle and planetary flight programs.
Investigation of advanced reactor and isotopic power systems.
Research on advanced nuclear propulsion concepts and the Nuclear Engine for Rocket Vehicle Application (NERVA) engine.

Supporting Space Activities: NASA: Operation and equipment of the stations of the tracking and data acquisition network.
Research and development to improve the capability of the specialized ground equipment.
Promotion of new advances in technology generated by space R&D efforts into other areas of the economy.

Aircraft Technology: NASA: Research in the areas of aerodynamics, flight dynamics, propulsion, operating and vehicle systems, life sciences, electronics, materials and structures, and noise reduction for the general purpose of improving civil and military aircraft.
Design and fabrication of an experimental short takeoff and landing (STOL) aircraft to provide technology for improved short-haul transportation systems.

APPENDIX A

Technical Notes

These technical notes deal with the scope and method of compiling this report and its relationship to other reports and studies.

Scope

This report is organized in two parts: part I, which is concerned with broad trends in and relationships between total Federal outlays by functions and R&D expenditures (excluding R&D plant) by functions, as well as with important changes in the ratio of R&D expenditures to total outlays within each function; and part II, which is focused on a detailed treatment of R&D expenditures, function by function.

In part II the sections are presented in descending order of total outlays for 1972. The latest functional totals and agency organization were used as the base, and for R&D expenditures data were reclassified for earlier years, where necessary, to show trends. Total outlays and R&D expenditures are given by subfunction as well as by function. R&D activities are further identified by agency programs, compared with prior-year data, and described in specific terms. Important trends are noted and analyzed.

Within each individual section of part II total outlays by subfunction are shown in descending order of size (in 1972) and R&D expenditures by subfunction are shown in descending order of 1972 estimates for them. Within the subfunctions R&D programs are also presented in descending order of size.

The sources of the data are (1) *The Budget of the United States Government, Fiscal Year 1972* for data on total outlays for 1962–72, (2) *The Budget of the United States Government, Fiscal Year 1971* for data on total outlays for 1960–61, (3) agency reports to the National Science Foundation on R&D expenditures for the years 1960–69, and (4) agency reports to the Office of Management and Budget on R&D expenditures for the years 1970–72. Outlays differ from expenditures only in that they include net lending; R&D expenditures do not include net lending. Outlays were used for overall function totals because the budget does not provide expenditure figures on a functional basis.

The 97 program descriptions, covering R&D programs conducted in the current (1970–72) period, were taken from *The Budget Appendix, Fiscal Year 1972* when they were obtainable (where the budget contained a specific R&D appropriation request) and otherwise from the descriptions of agency R&D programs included with data submitted to the Foundation for its *Federal Funds,* Vol. XIX report. (See addendum to *Technical Notes.*)

Method

Ratios: The data on total Federal outlays by functions and subfunctions were taken directly from *The Budget, 1972* and *The Budget, 1971*. Interest was excluded as a function so that 12 functions were covered in all. The annual totals used for the computation of share relationships represent total outlays minus interest and special allowances plus undistributed adjustments. Total outlays for each function were calculated as a percent of total Federal outlays (as used in the report), but total outlays for subfunctions could not be calculated either as shares of total Federal outlays or shares of the function totals because of the factor of offsetting receipts. No information was available to permit distribution of offsetting receipts among the various subfunctions although offsetting receipts could be deducted from function totals.[1]

Functions in this report represent somewhat higher percent shares of total Federal outlays than they do in OMB analyses because OMB calculations are based on total outlays including interest. For example, in this report national defense is 37 percent of total outlays in 1972, but OMB places it at 34 percent.[2]

R&D expenditure data can be directly related to total outlay data on a functional basis since outlays are the same as expenditures except that they include net lending (funds that will ultimately be repaid and hence cannot be termed expenditures). Ratios were calculated in all years for R&D expenditures within each function to the total outlays for that function. Ratios were also calculated in all years for the R&D expenditures within each function to the Federal R&D total. However, R&D expenditures by subfunction could not be calculated as a share of total outlays by subfunction because of the impossibility of deducting offsetting receipts from subfunction totals. Furthermore, attempts to relate R&D expenditures within subfunctions to total outlays for subfunctions would be meaningless in the case of those functions where all, or almost all, of the R&D activities within the function were assigned by OMB to a single subfunction.

Conversion to constant dollars: The overall trend table in the first section shows average annual growth rates for total outlays and R&D expenditures for selected periods in terms of both current and constant dollars. The conversion to constant dollars was based on the GNP implicit price deflator, but the deflator was converted

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[1] For some functions offsetting receipts are a negligible fraction of total outlays, but for others they are large enough to affect significantly the net outlay totals. The prime example is the function of natural resources where offsetting receipts (from the lease of mineral lands, disposal of public lands, and sales of power and timber) may represent as much as 50 percent of gross outlays.

[2] Office of Management and Budget, *The Budget of the United States Government, Fiscal Year 1972* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office), p. 7.

[3] See Department of Comme

[4] See Department of Comme
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much as 50 percent of gross outlays.
United States Government, Fiscal Year 1972
ernment Printing Office), p. 7.

deflator was converted to a fiscal year basis to conform with the dollar data.[3]

Average annual growth rate computations: Tables showing average annual percent changes are based on growth rate conversion tables which provide average annual growth rates for given time spans and given ratios of terminal year data to initial year data. Conversion tables are based on a standard compound interest rate formula.[4]

Classifications and definitions: The Budget arrangement of agencies and agency subdivisions under each of the functional and subfunctional categories has been followed *in toto* in the distribution of R&D program data. Current (1970–72) program distributions have been used for the report, and data have been given for prior years as though the present Federal organizational structure had always existed. Of course, earlier programs were often different in title and agency sponsorship than those prevailing today. In moving from present agency jurisdiction over R&D programs back through the early 1960's when many of the present agency units did not exist, it was sometimes necessary to estimate or make arbitrary decisions as to where to allocate dollars. Hence the tables do not represent a completely accurate spread of R&D relationships.

The definitions of functions and subfunctions are implicit in their content. OMB places agency programs under certain functional and subfunctional categories in the 1972 budget, and no attempt has been made to change the OMB concepts or arrangements. Each function, under the budget arrangement, embraces the agency components whose *primary* mission is related to that function. The health function, for example, includes only those agency units whose primary function is health-related. The outlays of the Department of Health, Education, and Welfare's National Institutes of Health are included but not the funds spent on health-related research and development by the Department of Defense or the National Aeronautics and Space Administration.

A report that presented data in a way that allowed each agency subdivision or program to relate to multiple functions would find functions overlapping and adding to more than 100 percent of the budget total. Data in this report, based as they are on the OMB classifications, are additive to 100 percent of the Federal budget and therefore relationships can be shown as percents of the total without double counting.

The definitions of R&D activities coincide with those provided the agencies by NSF in its *Federal Funds* survey questionnaire.

[3] See Department of Commerce, *Survey of Current Business*, business indicator series.

[4] See Department of Commerce, *Long Term Economic Growth, 1960-1965* (Washington, 1966), pp. 89, 91, 115.

Timing

This report shows data as of the time of the President's budget message in early February 1971. Outlays are those given in the President's request to Congress for the 1972 budget. R&D expenditures for 1970–72 are based on information submitted by the agencies to OMB for its special analysis of the R&D portion of the budget[5] with some adjustments made to correlate with known differences in reporting to OMB and the *Federal Funds* report or to account for revisions made by agencies after their submission of data to OMB. Data for fiscal years 1960 through 1970 are actual, but for 1971 and 1972 they are estimated and do not reflect final apportionment actions for 1971 or appropriation and apportionment actions for 1972 taken after the President's budget request.

Relation to Other Reports

(1) For a number of years the National Science Foundation has annually published a series covering Federal R&D funding by agencies. This report is entitled *Federal Funds for Research, Development, and Other Scientific Activities*. It includes R&D expenditures by agencies and R&D obligations by agencies. The obligations data are broken down into basic research, applied research, and development, as well as into performer groups, and fields of science. The agency expenditure data used in the *Federal Funds* series for 1960–69 have been used in this report to attain comparisons by functions.

(2) In a section of *Special Analyses, Budget of the United States Government, Fiscal Year 1972 (Special Analysis R, Federal Research and Development Programs)* the Office of Management and Budget publishes estimates of obligations and expenditures for Federal research, development, and R&D plant. The R&D expenditure data for fiscal years 1970–72 used in this report were taken from data submitted by the agencies to OMB for its special budget analysis (see above for discussion of adjustments). *Special Analysis R* and *Federal Funds* utilize the same definitions for research and development.

(3) Other reports have been published offering functional studies of the Federal budget, one or two of them even covering R&D data (appendix C). However, these do not follow the budget classifications completely but make certain rearrangements of data under the functional headings and even retitle some of the headings. Thi
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[5] *Special Analyses, Budget of the United States Government, Fiscal Year 1972*, "Special Analysis R, Federal Research and Development Programs," pp. 271ff.

some of the headings. This report is the only one issued thus far that provides Federal R&D data entirely by Federal budget functions and subfunctions.

A different classification system than that of OMB might be preferable for certain analytical purposes, but to obtain the necessary data would require a special survey among the Federal agencies. Agreement on the most meaningful functional categories would be very difficult to obtain. The resulting data might or might not be additive to 100 percent, depending on the nature of the questions. For these various reasons the present report was based on data already available and on the existing OMB classification system.

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APPENDIX B

Sources of R&D Program Descriptions

National Defense

Military Sciences—1972 Budget Appendix p. 310
Aircraft and Related Equipment—1972 Budget Appendix p. 310
Missiles and Related Equipment—1972 Budget Appendix p. 310
Military Astronautics and Related Equipment—1972 Budget Appendix pp. 310-311
Ships, Small Craft and Related Equipment—1972 Budget Appendix p. 311
Ordnance, Combat Vehicles and Related Equipment—1972 Budget Appendix p. 311
Other Equipment—1972 Budget Appendix p. 311
Program Management and Support—1972 Budget Appendix p. 311
Emergency Fund—1972 Budget Appendix p. 311
Atomic Energy—FF XIX submission*
Office of Emergency Preparedness—FF XIX submission

Space Research and Technology

Manned Space Flight
Space Science and Applications
Space Technology
Aircraft Technology
Supporting Space Activities

} 1972 Budget Appendix pp. 836-838 and FF XIX submission

Health

HEW: NIH—1972 Budget Appendix pp. 415-418
HEW: HSMHA: Mental Health—1972 Budget Appendix p. 391
HEW: HSMHA: Health Services R&D—1972 Budget Appendix p. 393
HEW: HSMHA: Maternal and Child Health—FF XIX submission
HEW: HSMHA: Disease Control—1972 Budget Appendix pp. 399-400
Environmental Control Activities—FF XIX submission (occupational health, community environ. magmt., health-related radiological health)
HEW: Food and Drug Administration—1972 Budget Appendix pp. 385-6 and FF XIX submission

* *Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1969, 1970, and 1971*, Vol. XIX.

EPA: Air Pollution Control—1971 Budget Appendix p. 371
Solid Waste Management—1971 Budget Appendix p. 372
Radiation–1971 Budget Appendix p. 372
Community Environment—1971 Budget Appendix p. 372
Pesticide Research—1971 Budget Appendix p. 370 and p. 582
FF XIX submission (Food and Drug)
FF XIX submission (Bur. of Commercial Fisheries)
FF XIX submission (Bur. of Sports Fish. & Wildlife)
HEW: Office of Child Development—1972 Budget Appendix p. 485

Commerce and Transportation

DOT: Office of the Secretary—1972 Budget Appendix p. 706
DOT: US Coast Guard—1972 Budget Appendix p. 719
DOT: FAA—1972 Budget Appendix p. 733
DOT: SST—1972 Budget Appendix p. 707
DOT: Urban Mass Transportation—1972 Budget Appendix p. 761
DOT: Federal RR Administration—1972 Budget Appendix pp. 755-6
DOT: Federal Highway Administration—FF XIX
DOT: National Highway Traffic Safety Administration— 1972 Budget Appendix p. 753
Postal Service—1972 Budget Appendix p. 844
Commerce: Maritime Administration—1972 Budget Appendix p. 274
Commerce: National Bureau of Standards—1972 Budget Appendix pp. 264-5
Commerce: NOAA—1972 Budget Appendix pp. 252-4
Commerce: Office of Business Economics—FF XIX submission
Commerce: Bureau of the Census–1972 Budget Appendix p. 225
Commerce: Patent Office—FF XIX submission
Commerce: Office of Telecommunications—1972 Budget Appendix p. 270
Commerce: Economic Development Administration—1972 Budget Appendix p. 234
Small Business Administration—FF XIX submission
Federal Communications Commission—FF XIX submission
Federal Trade Commission—FF XIX submission
Civil Aeronautics Board—FF XIX submission

Education and Manpower

Smithsonian Institution—FF XIX submission
Library of Congress—FF XIX submission
HEW: Office of Education—1972 Budget Appendix p. 451—FF XIX submission
Interior: Bureau of Mines: Health and Safety—1972 Budget Appendix p. 583
Labor: Manpower Administration—FF XIX submission
Labor: Bureau of Labor Statistics—FF XIX submission

Labor: Workplace Standar
Labor: Labor Management
National Science Foundati

Natural Resources

EPA: Water Control Office
Interior: Office of Water R
Interior: Office of Saline W
Tennessee Valley Authority
Dept. of the Army-Civil Fu
Interior: Bur. of Reclamatio
Interior: Bonneville Power
Interior: Bureau of Mines—
Interior: Office of Coal Res
USDA: Forest Service—197
Interior: Bureau of Land M
Interior: National Park Serv
Interior: Bureau of Outdoo
Interior: Bureau of Sport Fi
Interior: Geological Survey

Agriculture and Rura

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USDA: Cooperative State R
USDA: Economic Research
USDA: Farmer Cooperative
USDA: National Agricultura
USDA: Statistical Reporting

Community Develop

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HUD: Open Space Land—1
HUD: Low-Income Housing
Federal Home Loan Bank Bo

Income Security

HEW: Social and Rehabilita
HEW: Social Security Admi

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-1972 Budget Appendix

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451—FF XIX submission
udget Appendix p. 583

Labor: Workplace Standards Administration—FF XIX submission
Labor: Labor Management Services Administration—FF XIX submission
National Science Foundation—1972 Budget Appendix p. 946

Natural Resources

EPA: Water Control Office—1971 Budget Appendix p. 625
Interior: Office of Water Resources Research—1972 Budget Appendix p. 633
Interior: Office of Saline Water—FF XIX submission
Tennessee Valley Authority—FF XIX submission
Dept. of the Army-Civil Functions—1972 Budget Appendix p. 355
Interior: Bur. of Reclamation—FF XIX submission
Interior: Bonneville Power Administration—FF XIX submission
Interior: Bureau of Mines—1972 Budget Appendix pp. 581-2
Interior: Office of Coal Research—1972 Budget Appendix p. 588
USDA: Forest Service—1972 Budget Appendix p. 207
Interior: Bureau of Land Management—FF XIX submission
Interior: National Park Service—FF XIX submission
Interior: Bureau of Outdoor Recreation—1972 Budget Appendix p. 572
Interior: Bureau of Sport Fisheries and Wildlife—1972 Budget Appendix p. 591
Interior: Geological Survey—FF XIX submission

Agriculture and Rural Development

USDA: Agricultural Research Service—1972 Budget Appendix p. 110
USDA: Cooperative State Research Service—1972 Budget Appendix p. 116
USDA: Economic Research Service—1972 Budget Appendix p. 134
USDA: Farmer Cooperative Service—FF XIX submission
USDA: National Agricultural Library—FF XIX submission
USDA: Statistical Reporting Service—FF XIX submission

Community Development and Housing

Office of Economic Opportunity—1972 Budget Appendix p. 100
HUD: Research and Technology—1972 Budget Appendix p. 542
HUD: Open Space Land—1972 Budget Appendix p. 530
HUD: Low-Income Housing Demonstration—1972 Budget Appendix p. 543
Federal Home Loan Bank Board—FF XIX submission

Income Security

HEW: Social and Rehabilitation Services—FF XIX submission
HEW: Social Security Administration—FF XIX submission

Veterans Benefits and Services

FF XIX submission

International Affairs and Finance

State: Departmental Funds—FF XIX submission
U.S. Arms Control and Disarmament Agency—Annual Report 1969
State: AID—FF XIX submission
State: Peace Corps—FF XIX submission
United States Information Agency—FF XIX submission

General Government

Office of Science and Technology—1972 Budget Appendix p. 62
Treasury: Bureau of Engraving and Printing—FF XIX submission
Government Services Administration—FF XIX submission
Civil Service Commission—FF XIX submission
Justice: Law Enforcement Assistance Administration—FF XIX submission
Justice: Bur. of Narcotics and Dangerous Drugs—1972 Budget Appendix p. 656
Justice: Bureau of Prisons—FF XIX submission
Justice: Federal Bureau of Investigation—FF XIX submission
Advisory Commission on Intergovernmental Relations—1972 Budget Appendix p. 929

APPENDIX C

Statistical Tables

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NOTES

- The source of the data contained in table 1, Total Federal Outlays by Function and Subfunction, Fiscal Years 1960–72, is *The Budget of the United States Government, Fiscal Year 1972*, pp. 569–573 for 1962–72 data; and *The Budget of the United States Government, Fiscal Year 1971*, pp. 587–591 for 1960–61 data. The data for 1960–70 are actual; those for 1971 are estimated for current fiscal year ending June 30, 1971; 1972 data are requests of the President for July 1, 1971 through June 30, 1972.

- The sources of the data contained in table 2, Federal R&D Expenditures by Function, Subfunction and Agency Programs, Fiscal Years 1960–72, are agency responses to the surveys of Federal R&D activities conducted annually by the National Science Foundation and published in the *Federal Funds for Research, Development, and Other Scientific Activities* series for the 1960–69 period; and information submitted by the agencies to OMB for its special analysis of R&D programs, *Special Analyses, Budget of the United States Government, Fiscal Year 1972*, "Special Analysis R, Federal Research and Development Programs," pp. 271ff for 1970–72. Adjustments have been made for known differences in reporting by agencies to OMB and to the *Federal Funds* report.

Table C–1. Total Federal outlays by function and subfunction, fiscal years 1

(Dollars in millions)

Function and subfunction	Actual							
	1960	1961	1962	1963	1964	1965	1966	1967
Total	$92,223	$97,795	$106,813	$111,311	$118,584	$118,430	$134,652	$158,25
Interest	8,299	8,108	8,321	9,215	9,810	10,357	11,285	12,58
Special allowances	—	—	—	—	—	—	—	
Undistributed adjustments	−2,297	−2,449	−2,513	−2,644	−2,877	−3,109	−3,364	−3,9
Subtotal, all functions	86,221	92,136	101,005	104,740	111,651	111,182	126,731	149,6
National defense, total	45,908	47,381	51,097	52,257	53,591	49,578	56,785	70,0
Military personnel (including retired military personnel)—DOD-military [1]	11,738	12,085	13,032	13,000	14,195	14,771	16,753	19,78
Operation and maintenance—DOD-military [1]	10,223	10,611	11,594	11,874	11,932	12,349	14,710	19,00
Procurement—DOD-military [1]	13,334	13,095	14,532	16,632	15,351	11,839	14,339	19,01
RDT&E—DOD-military [1]	4,710	6,131	6,319	6,376	7,021	6,236	6,259	7,16
Military construction and other—DOD-military [1]	1,474	1,370	1,602	513	1,236	928	2,279	2,63
Allowances [2]—DOD-military [1]	—	—	—	—	—	—	—	
Military assistance [1]	1,631	1,351	1,337	1,406	1,209	1,125	1,003	85
Atomic energy [1]	2,623	2,713	2,806	2,758	2,764	2,625	2,403	2,26
Defense-related activities	244	104	92	24	172	136	−62	−1
Deductions for offsetting receipts [3]	−69	−80	−216	−325	−289	−431	−898	−61
Income security, total	18,150	21,202	22,530	24,084	25,110	25,702	29,016	31,16
Retirement and social insurance [1]	15,770	18,713	19,800	21,478	22,234	22,530	25,563	27,35
Public assistance	2,293	2,385	2,604	2,909	3,085	3,119	3,151	3,18
Social and individual services	88	104	133	176	199	249	410	69
Deductions for offsetting receipts [3]	−1	−2	−7	−479	−409	−196	−109	−5
Health, total	756	873	1,139	1,393	1,737	1,730	2,543	6,72
Development of health resources	554	642	786	949	1,170	1,039	1,212	1,55
Providing or financing medical services [1]	146	157	264	318	386	476	1,094	4,86
Prevention and control of health problems	58	77	91	128	182	215	238	30
Deductions for offsetting receipts [3]	−2	−2	−3	−3	−1	−1	−1	−
Commerce and transportation, total	4,794	5,068	5,430	5,765	6,511	7,399	7,171	7,59
Air transportation [1]	568	716	781	808	835	875	879	94
Water transportation	509	569	654	672	658	728	708	76
Ground transportation	2,984	2,656	2,817	3,057	3,686	4,092	4,043	4,09
Postal service	525	914	797	770	578	805	888	1,14
Advancement of business	154	147	304	239	252	405	351	33
Area and regional development	120	188	132	242	538	557	315	31
Regulation of business	59	67	72	82	91	98	99	11
Deductions for offsetting receipts [3]	−125	−189	−126	−104	−128	−160	−112	−11

Table C–1. Total Federal outlays by function and subfunction, fiscal years 1960–72

(Dollars in millions)

	Actual										Estimate	
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
3	$97,795	$106,813	$111,311	$118,584	$118,430	$134,652	$158,254	$178,833	$184,548	$196,588	$212,755	$ 229,232
9	8,108	8,321	9,215	9,810	10,357	11,285	12,588	13,744	15,791	18,312	19,433	19,687
	—	—	—	—	—	—	—	—	—	—	800	5,969
7	−2,449	−2,513	−2,644	−2,877	−3,109	−3,364	−3,936	−4,499	−5,117	−6,380	−7,197	−7,771
1	92,136	101,005	104,740	111,651	111,182	126,731	149,602	169,588	173,874	184,656	199,719	211,347
8	47,381	51,097	52,257	53,591	49,578	56,785	70,081	80,517	81,232	80,295	76,443	77,512
3	12,085	13,032	13,000	14,195	14,771	16,753	19,786	21,954	23,818	25,880	25,092	23,849
3	10,611	11,594	11,874	11,932	12,349	14,710	19,000	20,578	22,227	21,609	20,380	20,234
4	13,095	14,532	16,632	15,351	11,839	14,339	19,012	23,283	23,988	21,584	18,448	17,936
0	6,131	6,319	6,376	7,021	6,236	6,259	7,160	7,747	7,457	7,166	7,281	7,504
4	1,370	1,602	513	1,236	928	2,279	2,636	3,975	525	1,059	1,407	2,019
	—	—	—	—	—	—	—	—	—	—	945	3,580
1	1,351	1,337	1,406	1,209	1,125	1,003	858	654	789	731	1,130	1,025
3	2,713	2,806	2,758	2,764	2,625	2,403	2,264	2,466	2,450	2,453	2,275	2,318
4	104	92	24	172	136	−62	−17	139	260	79	−54	92
9	−80	−216	−325	−289	−431	−898	−619	−280	−281	−266	−461	−1,045
0	21,202	22,530	24,084	25,110	25,702	29,016	31,164	34,108	37,699	43,790	55,546	60,739
0	18,713	19,800	21,478	22,234	22,530	25,563	27,351	29,566	32,540	37,275	46,003	49,030
3	2,385	2,604	2,909	3,085	3,119	3,151	3,180	3,726	4,272	5,186	7,860	9,790
3	104	133	176	199	249	410	692	831	888	1,331	1,684	1,937
	−2	−7	−479	−409	−196	−109	−59	−16	−1	−1	−1	−18
5	873	1,139	1,393	1,737	1,730	2,543	6,721	9,672	11,696	12,995	14,928	16,010
4	642	786	949	1,170	1,039	1,212	1,556	1,826	1,918	2,097	2,228	2,380
5	157	264	318	386	476	1,094	4,866	7,455	9,315	10,344	12,037	12,945
3	77	91	128	182	215	238	301	394	465	561	664	703
	−2	−3	−3	−1	−1	−1	−2	−3	−2	−6	−2	−18
4	5,068	5,430	5,765	6,511	7,399	7,171	7,594	8,094	7,921	9,310	11,442	10,937
3	716	781	808	835	875	879	945	951	1,042	1,223	1,620	1,835
9	569	654	672	658	728	708	765	844	864	902	1,066	1,123
4	2,656	2,817	3,057	3,686	4,092	4,043	4,093	4,367	4,413	4,632	5,145	5,310
5	914	797	770	578	805	888	1,141	1,080	920	1,510	2,353	1,333
4	147	304	239	252	405	351	332	447	152	487	535	536
9	188	132	242	538	557	315	318	472	584	590	747	802
9	67	72	82	91	98	99	118	98	107	120	176	141
	−189	−126	−104	−128	−160	−112	−119	−165	−162	−154	−200	−142

Function and subfunction	Actual							
	1960	1961	1962	1963	1964	1965	1966	1967
Veterans benefits and services, total....	5,426	5,688	5,625	5,520	5,681	5,722	5,920	6,897
Income security for veterans.....	4,054	4,439	4,476	4,706	4,646	4,710	4,700	5,209
Veterans education, training, and rehabilitation.....	531	415	159	101	77	58	54	305
Veterans housing.....	206	152	236	−109	44	(*)	169	304
Hospital and medical care for veterans.	963	1,032	1,085	1,147	1,231	1,271	1,320	1,393
Other veterans benefits and services..	187	187	180	176	185	179	196	195
Deductions for offsetting receipts.....	−514	−537	−511	−501	−502	−497	−518	−509
Education and manpower, total.....	1,113	1,253	1,406	1,502	1,751	2,284	4,258	5,853
Elementary and secondary education..	397	417	429	527	566	645	1,804	2,439
Higher education.....	272	291	357	419	383	414	705	1,159
Vocational education.....	39	40	40	41	41	132	136	250
Manpower training and employment services.....	150	190	194	209	299	534	989	1,236
Science education and basic research.	120	143	183	206	310	309	368	415
Other education aids.....	58	76	98	98	110	158	155	264
Other manpower aids.....	80	100	110	7	49	100	112	100
Deductions for offsetting receipts.....	−3	−4	−4	−5	−5	−9	−11	−11
Agriculture and rural development, total.	3,322	3,340	4,123	5,139	5,185	4,807	3,697	4,376
Farm income stabilization.....	2,383	2,343	3,143	4,060	4,134	3,667	2,536	3,167
Rural housing and public facilities.....	333	335	291	375	326	354	309	330
Agricultural land and water resources..	324	347	368	324	325	342	347	353
Research and other agricultural services.....	312	344	363	415	441	485	531	570
Deductions for offsetting receipts.....	−29	−30	−42	−36	−42	−42	−44	−44
General government, total.....	1,327	1,491	1,650	1,810	2,040	2,210	2,292	2,510
Legislative functions.....	109	118	135	131	126	142	159	167
Judicial functions.....	49	52	57	63	66	76	79	87
Executive direction and management..	20	22	22	21	22	23	24	25
Central fiscal operations.....	573	622	668	733	808	844	886	968
General property and records management.....	351	356	355	416	553	565	550	617
Central personnel management [1].....	82	92	106	110	110	107	107	116
Law enforcement and justice.....	263	289	300	323	335	366	385	426
National capital region.....	30	50	73	70	58	61	73	84
Other general government.....	88	109	136	139	189	190	192	218
Deductions for offsetting receipts [3].....	−238	−220	−204	−196	−226	−165	−162	−199

Actual										Estimate	
1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
5,688	5,625	5,520	5,681	5,722	5,920	6,897	6,882	7,640	8,677	9,969	10,644
4,439	4,476	4,706	4,646	4,710	4,700	5,209	4,997	5,528	6,021	6,551	6,973
415	159	101	77	58	54	305	478	701	1,015	1,715	1,981
152	236	−109	44	(*)	169	304	210	102	54	−147	−334
1,032	1,085	1,147	1,231	1,271	1,320	1,393	1,472	1,566	1,802	2,056	2,230
187	180	176	185	179	196	195	218	237	260	288	301
−537	−511	−501	−502	−497	−518	−509	−492	−493	−477	−493	−508
1,253	1,406	1,502	1,751	2,284	4,258	5,853	6,739	6,525	7,289	8,300	8,808
417	429	527	566	645	1,804	2,439	2,595	2,480	2,968	3,245	3,562
291	357	419	383	414	705	1,159	1,393	1,230	1,381	1,458	1,302
40	40	41	41	132	136	250	265	262	289	423	501
190	194	209	299	534	989	1,236	1,587	1,560	1,602	2,017	2,156
143	183	206	310	309	368	415	449	490	464	502	546
76	98	98	110	158	155	264	334	373	429	419	463
100	110	7	49	100	112	100	132	142	169	248	308
−4	−4	−5	−5	−9	−11	−11	−16	−13	−14	−12	−29
3,340	4,123	5,139	5,185	4,807	3,697	4,376	5,943	6,221	6,201	5,262	5,804
2,343	3,143	4,060	4,134	3,667	2,536	3,167	4,542	5,000	4,589	4,075	4,227
335	291	375	326	354	309	330	474	318	579	60	432
347	368	324	325	342	347	353	351	343	344	353	334
344	363	415	441	485	531	570	618	645	730	816	855
−30	−42	−36	−42	−42	−44	−44	−42	−85	−41	−42	−43
1,491	1,650	1,810	2,040	2,210	2,292	2,510	2,561	2,866	3,336	4,381	4,970
118	135	131	126	142	159	167	180	192	229	262	277
52	57	63	66	76	79	87	94	110	133	149	173
22	22	21	22	23	24	25	27	31	37	50	56
622	668	733	808	844	886	968	1,024	1,094	1,271	1,416	1,570
356	355	416	553	565	550	617	569	567	595	644	692
92	106	110	110	107	107	116	140	146	166	202	255
289	300	323	335	366	385	426	452	534	666	1,116	1,477
50	73	70	58	61	73	84	104	162	226	363	414
109	136	139	189	190	192	218	243	268	272	433	561
−220	−204	−196	−226	−165	−162	−199	−272	−238	−259	−254	−506

Function and subfunction	Actual						
	1960	1961	1962	1963	1964	1965	1966
Community development and housing, total	971	191	589	−880	−185	288	2,644
Concentrated community development	—	—	—	—	—	51	302
Community environment	105	145	227	173	240	331	365
Community facilities	18	15	27	36	51	46	38
Community planning and administration	−72	−79	11	24	29	32	16
Low and moderate income housing aids	145	155	170	198	37	81	391
Maintenance of the housing mortgage market	787	−36	169	−1,289	−511	−237	1,545
Deductions for offsetting receipts	−11	−9	−16	−22	−31	−16	−13
Natural resources, total	999	1,548	1,665	1,483	1,944	2,028	1,999
Water resources and power	1,241	1,395	1,578	1,718	1,798	1,867	2,061
Land management	305	428	382	422	459	509	556
Mineral resources	30	28	30	25	46	59	62
Recreational resources	125	146	151	180	202	215	241
Other natural resources programs	46	51	58	67	70	79	90
Deductions for offsetting receipts	−748	−501	−535	−929	−632	−701	−1,011
International affairs and finance, total	3,054	3,357	4,492	4,115	4,117	4,340	4,490
Conduct of foreign affairs [1]	214	216	248	346	296	347	315
Economic and financial assistance	1,391	1,877	2,325	1,968	1,756	2,041	2,329
Foreign information and exchange activities	137	158	197	201	207	223	227
Food for Peace	1,458	1,823	1,947	2,040	2,049	1,852	1,784
Deductions for offsetting receipts [3]	−146	−716	−226	−441	−191	−123	−165
Space research and technology, total	401	744	1,257	2,552	4,170	5,091	5,933
Manned space flight	113	279	565	1,516	2,768	3,538	4,210
Space science and applications	133	249	420	576	754	751	778
Space technology	52	87	159	303	432	484	435
Aircraft technology	72	51	31	36	40	58	75
Supporting space activities	30	79	82	122	178	262	435
Deductions for offsetting receipts	—[4]	—[4]	—[4]	—[4]	—1	—2	—1

[1] Entries net of offsetting receipts.
[2] For all volunteer force and civilian and military pay increases for Department of Defense.
[3] Excludes offsetting receipts which have been distributed by subfunction above.
[4] Less than $500 thousand.
Source: Office of Management and Budget.

Actual										Estimate	
1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
191	589	−880	−185	288	2,644	2,616	4,076	1,961	2,965	3,858	4,495
—	—	—	—	51	302	452	648	684	816	1,168	1,235
145	227	173	240	331	365	465	486	632	1,105	1,173	1,397
15	27	36	51	46	38	74	106	146	181	229	416
−79	11	24	29	32	16	33	37	47	69	131	151
155	170	198	37	81	391	478	948	871	1,280	1,633	1,948
−36	169	−1,289	−511	−237	1,545	1,133	1,863	−406	−487	−423	−651
−9	−16	−22	−31	−16	−13	−19	−12	−13	−[4]	−53	−[4]
1,548	1,665	1,483	1,944	2,028	1,999	1,821	1,655	2,081	2,480	2,636	4,243
1,395	1,578	1,718	1,798	1,867	2,061	2,158	2,251	2,256	2,245	3,025	3,864
428	382	422	459	509	556	618	639	643	754	864	830
28	30	25	46	59	62	73	85	71	94	173	68
146	151	180	202	215	241	285	331	372	370	536	615
51	58	67	70	79	90	93	102	107	122	133	143
−501	−535	−929	−632	−701	−1,011	−1,408	−1,753	−1,368	−1,105	−2,094	−1,276
3,357	4,492	4,115	4,117	4,340	4,490	4,547	4,619	3,785	3,570	3,586	4,032
216	248	346	296	347	315	336	354	371	398	421	453
1,877	2,325	1,968	1,756	2,041	2,329	3,057	3,053	2,420	2,231	2,190	2,636
158	197	201	207	223	227	245	253	237	235	240	243
1,823	1,947	2,040	2,049	1,852	1,784	1,452	1,204	975	937	1,014	962
−716	−226	−441	−191	−123	−165	−542	−245	−217	−232	−279	−261
744	1,257	2,552	4,170	5,091	5,933	5,423	4,721	4,247	3,749	3,368	3,151
279	565	1,516	2,768	3,538	4,210	3,649	3,096	2,781	2,209	1,887	1,662
249	420	576	754	751	778	796	700	569	656	631	727
87	159	303	432	484	435	440	410	344	328	286	234
51	31	36	40	58	75	89	128	168	188	184	195
79	82	122	178	262	435	452	390	390	374	393	347
−[4]	−[4]	−[4]	−1	−2	−1	−2	−3	−6	−6	−13	−13

ses for Department of Defense.
by subfunction above.

Table C–2. Federal R&D expenditures by function, subfunction, and ag

(Dollars in millions)

Function, subfunction, and agency program	Actual							
	1960	1961	1962	1963	1964	1965	1966	
Total, all functions	$7,300.5	$8,747.9	$9,831.6	$11,338.5	$13,758.9	$13,811.4	$14,970.2	$1
National defense, total	6,317.8	7,351.4	7,747.7	7,869.5	8,665.2	7,864.0	7,887.9	
Military sciences—DOD-RDT&E	362.0	507.0	616.0	838.0	878.0	573.0	619.0	
Aircraft and related equipment—DOD-RDT&E	632.0	547.0	624.0	544.0	939.0	1,017.0	976.0	
Missiles and related equipment—DOD-RDT&E	2,059.0	3,025.0	2,777.0	2,241.0	2,352.0	1,901.0	1,801.0	
Military astronautics and related equipment—DOD-RDT&E	512.0	518.0	749.0	946.0	1,284.0	921.0	930.0	
Ships, small craft and related equipment—DOD-RDT&E	154.0	209.0	190.0	219.0	264.0	249.0	283.0	
Ordnance, combat vehicles and related equipment—DOD-RDT&E	222.0	212.0	227.0	208.0	280.0	330.0	361.0	
Other equipment—DOD-RDT&E	512.0	561.0	498.0	848.0	440.0	704.0	785.0	
Programwide management and support—DOD-RDT&E	565.0	551.0	637.0	232.0	585.0	542.0	504.0	
Emergency fund—DOD-RDT&E	—	—	—	—	—	—	—	
Other DOD	842.0	369.0	399.0	415.0	408.0	387.0	416.0	
Military assistance	—	—	—	—	—	—	—	
Atomic energy	761.7	850.2	1,029.2	1,077.9	1,236.0	1,240.7	1,212.4	
Defense related activities	4.7	1.4	.5	.6	.3	.1	.6	
Space research and technology, total	346.6	646.1	1,142.7	2,327.0	3,733.2	4,562.0	5,360.6	
Manned space flight	113.1	273.6	508.5	1,356.9	2,436.1	3,137.5	3,818.8	
Space science and applications	122.2	225.5	400.3	552.5	714.0	725.7	754.6	
Space technology	39.1	73.1	136.5	278.3	352.1	401.2	365.5	
Aircraft technology	57.6	42.3	28.5	34.0	68.8	87.6	101.1	
Supporting space activities	14.4	31.6	68.9	105.4	162.3	210.2	320.8	

2. **Federal R&D expenditures by function, subfunction, and agency programs**

(Dollars in millions)

	Actual									Estimate	
	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
9	$9,831.6	$11,338.5	$13,758.9	$13,811.4	$14,970.2	$16,073.0	$16,333.3	$15,695.4	$15,155.5	$15,366.1	$15,711.5
4	7,747.7	7,869.5	8,665.2	7,864.0	7,887.9	8,856.6	9,352.7	9,058.0	8,783.7	8,860.9	8,998.1
0	616.0	838.0	878.0	573.0	619.0	610.0	521.0	571.0	501.0	496.0	486.0
0	624.0	544.0	939.0	1,017.0	976.0	1,048.0	1,335.0	1,031.0	1,239.0	1,708.0	1,975.0
0	2,777.0	2,241.0	2,352.0	1,901.0	1,801.0	2,502.0	2,522.0	2,410.0	2,265.0	2,115.0	1,787.0
0	749.0	946.0	1,284.0	921.0	930.0	983.0	1,220.0	1,159.0	756.0	489.0	489.0
0	190.0	219.0	264.0	249.0	283.0	296.0	261.0	329.0	362.0	330.0	465.0
0	227.0	208.0	280.0	330.0	361.0	343.0	324.0	336.0	381.0	327.0	340.0
0	498.0	848.0	440.0	704.0	785.0	951.0	1,120.0	1,053.0	1,150.0	1,220.0	1,340.0
0	637.0	232.0	585.0	542.0	504.0	426.0	339.0	458.0	413.0	498.0	498.0
—	—	—	—	—	—	—	—	—	—	15.0	45.0
0	399.0	415.0	408.0	387.0	416.0	439.0	340.0	304.4	369.0	355.8	321.7
—	—	—	—	—	—	—	—	—	—	—	—
2	1,029.2	1,077.9	1,236.0	1,240.7	1,212.4	1,257.3	1,369.0	1,405.9	1,346.0	1,306.6	1,251.4
4	.5	.6	.3	.1	.6	.7	.7	.7	.1	.1	.6
1	1,142.7	2,327.0	3,733.2	4,562.0	5,360.6	5,137.1	4,597.6	4,186.4	3,698.8	3,318.9	3,109.4
6	508.5	1,356.9	2,436.1	3,137.5	3,818.8	3,477.1	3,027.7	2,754.4	2,194.7	1,878.2	1,648.5
5	400.3	552.5	714.0	725.7	754.6	781.3	691.9	562.5	648.5	628.7	723.4
1	136.5	278.3	352.1	401.2	365.5	377.7	368.8	330.0	315.1	284.3	233.2
3	28.5	34.0	68.8	87.6	101.1	116.4	144.5	161.6	183.0	178.6	190.0
6	68.9	105.4	162.3	210.2	320.8	381.3	364.7	377.9	357.5	349.1	314.3

Function, subfunction, and agency program	Actual							
	1960	1961	1962	1963	1964	1965	1966	1967
Health, total	277.5	321.7	447.1	557.0	704.4	621.3	753.7	881.
Development of health resources	258.8	296.5	413.4	519.3	653.4	571.0	687.1	798.
National Institutes of Health (HEW)	226.9	262.0	359.1	458.3	569.5	488.9	605.3	710.
Health Services and Mental Health Administration (HEW) [1]	31.9	34.4	54.3	61.0	83.9	82.1	81.8	88.
Providing or financing medical services	.3	.6	.5	.6	.6	.6	.9	1.
Health Services and Mental Health Administration (HEW) [2]	.3	.6	.5	.6	.6	.6	.9	1.
Prevention and control of health problems	18.4	24.6	33.2	37.1	50.4	49.6	65.7	82.
Environmental and air pollution control (EPA)	[3] 16.2	[3] 21.3	[3] 30.4	[3] 32.7	[3] 44.2	[3] 43.0	[3] 55.3	[3] 71.6
Health Services and Mental Health Administration (HEW) [4]								
Food and Drug Administration (HEW)	2.2	3.3	2.7	4.4	6.3	6.6	10.4	10.
Commerce and Transportation, total	85.1	99.9	108.0	140.2	144.5	184.2	241.5	340.3
Air transportation	38.2	48.4	46.2	66.5	62.7	94.0	141.3	191.9
Supersonic aircraft (DOT) [5]	—	—	—	6.8	5.0	47.9	99.2	145.3
Federal Aviation Administration (DOT)	.2	48.4	46.2	59.7	57.7	46.1	42.1	46.6
Water transportation	5.2	2.9	6.0	7.9	9.3	10.2	13.3	13.7
U.S. Coast Guard (DOT)	.6	.7	1.2	1.1	1.8	2.2	7.4	7.5
Maritime Administration (Commerce)	4.6	2.2	4.8	6.8	7.5	8.0	5.9	6.2
Ground transportation	4.6	3.7	3.2	3.6	4.2	5.4	8.0	31.3
Urban Mass Transportation Administration (DOT)	—	—	—	—	—	—	—	—
National Highway Safety Administration (DOT)	—	—	—	—	—	—	—	1.1
Federal Highway Administration (DOT)	4.6	3.7	3.2	3.6	4.2	5.4	6.0	22.6
Federal Rail Administration (DOT)	—	—	—	—	—	—	2.0	4.5
Urban Mass Transportation (HUD)	—	—	—	—	—	—	[6]	3.1

Actual									Estimate	
1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
447.1	557.0	704.4	621.3	753.7	881.9	1,081.0	1,045.4	1,117.3	1,250.2	1,348.4
413.4	519.3	653.4	571.0	687.1	798.7	996.5	974.2	1,013.7	1,122.3	1,210.9
359.1	458.3	569.5	488.9	605.3	710.2	875.2	852.3	879.1	972.2	1,053.8
54.3	61.0	83.9	82.1	81.8	88.5	121.3	121.9	134.5	150.0	157.0
.5	.6	.6	.6	.9	1.1	1.8	6.9	12.7	12.7	7.0
.5	.6	.6	.6	.9	1.1	1.8	6.9	12.7	12.7	7.0
33.2	37.1	50.4	49.6	65.7	82.1	82.8	64.2	90.9	115.2	130.5
[3] 30.4	[3] 32.7	[3] 44.2	[3] 43.0	[3] 55.3	[3] 71.6	[3] 65.8	[3] 56.3	33.5	54.6	65.9
2.7	4.4	6.3	6.6	10.4	10.5	17.0	8.0	39.1 18.3	38.5 22.1	36.7 27.8
108.0	140.2	144.5	184.2	241.5	340.3	331.2	336.6	410.5	601.9	761.5
46.2	66.5	62.7	94.0	141.3	191.9	147.5	124.0	167.7	300.3	364.5
—	6.8	5.0	47.9	99.2	145.3	99.7	80.6	111.3	232.5	281.0
46.2	59.7	57.7	46.1	42.1	46.6	47.8	43.4	56.4	67.8	83.5
6.0	7.9	9.3	10.2	13.3	13.7	20.6	23.7	22.9	30.6	52.7
1.2	1.1	1.8	2.2	7.4	7.5	12.6	13.8	16.3	19.4	36.7
4.8	6.8	7.5	8.0	5.9	6.2	8.0	9.9	6.6	11.2	16.0
3.2	3.6	4.2	5.4	8.0	31.3	52.5	66.4	63.8	90.5	142.2
—	—	—	—	—	—	—	12.6	15.6	29.9	59.3
—	—	—	—	—	1.1	9.5	10.9	10.6	22.4	35.6
3.2	3.6	4.2	5.4	6.0	22.6	29.0	28.2	27.0	23.7	28.9
—	—	—	—	2.0	4.5	13.0	11.5	8.4	12.3	15.9
—	—	—	—	[6]	3.1	1.0	3.2	2.2	2.3	2.5

Function, subfunction, and agency program	Actual							
	1960	1961	1962	1963	1964	1965	1966	1967
Commerce and transportation (Con't)								
Postal service	5.9	6.4	7.2	6.9	7.1	8.3	8.3	12.2
Bureau of Research and Engineering (Postal Service)	5.9	6.4	7.2	6.9	7.1	8.3	8.3	12.2
Advancement of business	30.9	38.0	43.9	53.8	59.9	65.3	69.8	81.4
National Oceanic and Atmosphere Administration (Commerce)	13.2	16.9	21.6	26.3	30.9	32.4	37.3	47.3
National Bureau of Standards (Commerce)	13.0	16.9	18.5	23.4	23.3	25.7	26.1	25.7
Office of the Secretary (DOT)	—	—	—	—	.9	1.1	1.0	2.9
Office of Business Economics (Commerce)	1.3	1.5	1.5	1.8	2.0	2.3	2.6	2.6
Office of Telecommunications (Commerce)	—	—	—	—	—	—	—	—
Bureau of the Census (Commerce)	1.0	1.1	1.0	1.1	1.8	2.5	1.9	2.5
Patent Office (Commerce)	.4	.5	.7	.7	.6	.7	.4	.4
Small Business Administration	2.0	1.1	.6	.5	.4	.6	.5	([6])
Area and regional development	—	—	.3	.7	.7	.3	.1	8.9
Economic Development Administration (Commerce)	—	—	.3	.7	.7	.3	.1	8.9
Regulation of business	.3	.5	1.2	.8	.6	.7	.7	.9
Federal Communications Commission	.1	.2	.9	.5	.3	.3	.3	.4
Federal Trade Commission	.1	.2	.2	.2	.2	.3	.3	.3
Civil Aeronautics Board	.1	.1	.1	.1	.1	.1	.1	.2
Education and manpower, total	68.6	87.5	111.6	132.3	179.9	183.5	231.8	320.1
General science	57.6	71.3	92.1	110.6	153.8	149.7	175.7	224.0
Science research project support (NSF)	36.6	46.4	60.7	66.2	94.4	88.0	114.0	141.4
National and special research programs (NSF)	4.6	5.9	7.7	11.0	16.4	15.4	13.1	17.2
National research centers (NSF)	1.8	2.3	3.0	5.5	8.6	10.1	11.7	16.1
All other research and development (NSF)	14.6	16.7	20.7	27.9	34.4	36.2	36.9	49.3
Education	7.7	12.6	13.8	13.3	17.3	24.5	45.8	82.5
Office of Education (HEW)	6.5	11.3	10.9	9.6	12.7	19.4	37.5	70.0
Smithsonian Institution	1.2	1.3	2.8	3.7	4.5	5.0	7.8	11.8
Office of Child Development (HEW)	—	—	—	—	—	—	—	—
Library of Congress	—	([6])	.1	([6])	.1	.1	.5	.7

Actual									Estimate	
1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
7.2	6.9	7.1	8.3	8.3	12.2	13.3	20.9	29.7	37.2	48.7
7.2	6.9	7.1	8.3	8.3	12.2	13.3	20.9	29.7	37.2	48.7
43.9	53.8	59.9	65.3	69.8	81.4	82.7	93.6	115.5	137.2	147.8
21.6	26.3	30.9	32.4	37.3	47.3	51.7	58.3	73.6	84.9	90.1
18.5	23.4	23.3	25.7	26.1	25.7	23.5	27.5	29.1	31.3	33.9
—	—	.9	1.1	1.0	2.9	.8	2.2	7.4	13.0	14.5
1.5	1.8	2.0	2.3	2.6	2.6	3.7	2.7	3.7	3.9	4.4
—	—	—	—	—	—	—	—	—	2.2	2.9
1.0	1.1	1.8	2.5	1.9	2.5	2.3	2.3	1.2	1.4	1.4
.7	.7	.6	.7	.4	.4	.5	.4	.4	.5	.6
.6	.5	.4	.6	.5	(6)	.2	.2	.1	.1	.1
.3	.7	.7	.3	.1	8.9	13.6	6.1	9.5	4.8	4.4
.3	.7	.7	.3	.1	8.9	13.6	6.1	9.5	4.8	4.4
1.2	.8	.6	.7	.7	.9	1.0	1.9	1.3	1.3	1.2
.9	.5	.3	.3	.3	.4	.4	1.2	.6	.6	.5
.2	.2	.2	.3	.3	.3	.4	.5	.4	.4	.5
.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3
111.6	132.3	179.9	183.5	231.8	320.1	381.2	404.6	427.1	496.1	621.7
92.1	110.6	153.8	149.7	175.7	224.0	266.5	277.9	288.3	327.0	400.5
60.7	66.2	94.4	88.0	114.0	141.4	173.7	183.4	166.8	186.8	213.0
7.7	11.0	16.4	15.4	13.1	17.2	15.2	8.9	30.4	61.1	102.9
3.0	5.5	8.6	10.1	11.7	16.1	16.6	22.9	27.8	29.5	33.3
20.7	27.9	34.4	36.2	36.9	49.3	61.0	62.7	63.3	49.6	51.3
13.8	13.3	17.3	24.5	45.8	82.5	101.4	111.8	115.9	125.2	164.7
10.9	9.6	12.7	19.4	37.5	70.0	86.8	93.4	92.7	96.2	120.3
2.8	3.7	4.5	5.0	7.8	11.8	13.3	16.8	20.1	23.5	30.7
—	—	—	—	—	—	—	—	1.0	2.5	10.5
.1	(6)	.1	.1	.5	.7	1.3	1.6	2.1	2.9	3.2

Function, subfunction, and agency program	Actual							
	1960	1961	1962	1963	1964	1965	1966	196
Manpower	3.3	3.6	5.7	8.4	8.8	9.3	10.3	
Health and safety, Bureau of Mines (Interior)	.9	.9	1.2	1 5.	1.6	2.0	2.1	
Manpower Administration (Labor)	.9	.9	1.5	3.1	3.4	3.4	3.9	
Bureau of Labor Statistics (Labor)	1.1	1.3	1.8	2.3	2.3	2.2	2.9	
Workplace Standards Administration (Labor)	.4	.4	1.2	1.4	1.4	1.6	1.3	
Labor Management Services Administration (Labor)	—	.1	(6)	.1	.1	.1	.1	
Natural resources, total	73.6	82.1	96.7	115.5	116.3	135.3	150.7	17
Water resources and power	7.1	8.5	12.9	21.0	27.1	35.2	40.4	5
Water Control Office (EPA)	—	—	4.3	6.1	7.6	8.4	6.1	1
Office of Saline Water (Interior)	1.2	1.9	2.0	6.7	8.3	10.7	11.2	1
Army—Civil functions (DOD)	1.6	1.6	2.0	2.7	4.0	4.6	5.2	
Office of Water Resources Research (Interior)	—	—	—	—	—	2.3	5.7	
Tennessee Valley Authority	2.8	3.0	3.2	3.6	5 .1	5.6	6.4	
Bureau of Reclamation (Interior)	1.4	1.9	1.2	1.6	1.8	3.2	5.1	
Bonneville Power Administration (Interior)	.1	.1	.2	.3	.3	.4	.7	
Office of the Secretary (Interior)	—	—	—	—	—	—	—	
Land management	15.5	17.9	21.8	25.2	27.8	30.6	32.5	3
Forest Service (Agriculture)	15.4	17.8	21.6	24.8	27.4	30.1	31.9	3
Bureau of Land Management (Interior)	.1	.1	.2	.4	.4	.5	.6	
Mineral resources	23.1	24.9	26.9	29.2	26.3	28.3	30.8	3
Bureau of Mines (Interior)[7]	23.1	24.9	25.1	27.6	23.9	25.1	26.8	2
Office of Coal Research (Interior)	—	—	1.8	1.6	2.4	3.2	4.0	
Recreational resources	10.0	10.4	12.1	13.4	13.2	17.2	19.8	1
Bureau of Sport Fisheries and Wildlife (Interior)	9.3	9.4	10.6	11.4	11.6	15.1	17.7	1
Bureau of Outdoor Recreation (Interior)	—	—	—	.1	.1	.1	(6)	
National Park Service (Interior)	.7	1.0	1.5	1.9	1.5	2.0	2.1	
Other natural resources programs	17.9	20.4	23.0	26.7	21.9	24.0	27.2	3
Geological Survey (Interior)	17.9	20.4	23.0	26.7	21.9	24.0	27.2	3
Office of the Secretary (Interior)	—	—	—	—	—	—	—	

				Actual						Estimate	
61	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
3.6	5.7	8.4	8.8	9.3	10.3	13.6	13.3	14.9	22.9	43.9	56.5
.9	1.2	1 5.	1.6	2.0	2.1	1.9	2.1	2.2	3.1	20.0	31.8
.9	1.5	3.1	3.4	3.4	3.9	6.7	6.2	6.5	13.7	16.9	17.5
1.3	1.8	2.3	2.3	2.2	2.9	3.4	3.4	3.8	3.8	3.7	3.7
.4	1.2	1.4	1.4	1.6	1.3	1.5	1.5	2.3	2.0	2.5	2.5
.1	(6)	.1	.1	.1	.1	.1	.1	.1	.3	.7	.8
82.1	96.7	115.5	116.3	135.3	150.7	173.7	199.0	221.4	244.5	266.0	277.7
8.5	12.9	21.0	27.1	35.2	40.4	54.4	73.5	84.3	93.3	101.5	103.5
—	4.3	6.1	7.6	8.4	6.1	14.8	16.5	22.3	30.0	31.1	29.9
1.9	2.0	6.7	8.3	10.7	11.2	11.6	25.4	25.9	23.2	27.2	24.3
1.6	2.0	2.7	4.0	4.6	5.2	7.9	7.1	9.1	10.4	9.5	21.8
—	—	—	—	2.3	5.7	6.2	8.8	10.2	11.8	11.7	12.6
3.0	3.2	3.6	5 .1	5.6	6.4	7.1	7.8	8.3	8.3	9.4	10.3
1.9	1.2	1.6	1.8	3.2	5.1	6.0	6.8	7.1	7.5	9.6	9.6
.1	.2	.3	.3	.4	.7	.8	1.1	1.4	2.1	2.7	3.0
—	—	—	—	—	—	—	—	—	—	.5	1.0
17.9	21.8	25.2	27.8	30.6	32.5	38.7	36.4	41.3	46.4	49.2	50.2
17.8	21.6	24.8	27.4	30.1	31.9	38.0	35.6	40.6	45.7	48.6	49.5
.1	.2	.4	.4	.5	.6	.7	.8	.7	.6	.7	.7
24.9	26.9	29.2	26.3	28.3	30.8	35.5	37.5	40.8	47.2	52.8	54.1
24.9	25.1	27.6	23.9	25.1	26.8	29.7	31.6	33.4	33.6	38.4	35.6
—	1.8	1.6	2.4	3.2	4.0	5.8	5.9	7.4	13.6	14.4	18.5
10.4	12.1	13.4	13.2	17.2	19.8	13.2	16.3	19.8	16.9	19.6	22.1
9.4	10.6	11.4	11.6	15.1	17.7	10.5	13.5	17.0	16.8	19.5	21.9
—	—	.1	.1	.1	(6)	.1	.1	.2	.1	.1	.1
1.0	1.5	1.9	1.5	2.0	2.1	2.6	2.7	2.6	—	—	—
20.4	23.0	26.7	21.9	24.0	27.2	31.9	35.3	35.2	40.8	42.8	47.9
20.4	23.0	26.7	21.9	24.0	27.2	31.9	35.3	35.2	40.8	42.8	47.5
—	—	—	—	—	—	—	—	—	—	—	.4

Function, subfunction, and agency program	Actual							
	1960	1961	1962	1963	1964	1965	1966	19
Agriculture and rural development, total	105.2	123.7	129.5	139.2	150.9	169.6	196.6	2
Farm income stabilization	—	—	—	—	—	—	—	
Rural housing and public facilities	—	—	—	—	—	—	—	
Agricultural land and water resources	—	—	—	—	—	—	—	
Research and other agricultural services	105.2	123.7	129.5	139.2	150.9	169.6	196.6	2
Agricultural Research Service (USDA)	104.5	80.0	85.0	90.8	98.4	111.5	132.6	1
Cooperative State Research Service (USDA)	—	33.1	35.7	37.9	41.5	46.8	51.7	
Economic Research Service (USDA)	—	8.9	8.1	9.8	9.8	10.0	10.8	
Farmer Cooperative State Research Service (USDA)	.4	.5	.3	.3	.7	.7	.7	
National Agricultural Library (USDA)	.3	.8	—	—	(6)	.1	.1	
Statistical Reporting Service (USDA)	—	.4	.4	.4	.5	.5	.7	
Community development and housing, total	—	(6)	.4	.2	.2	4.5	51.0	
Concentrated community development	—	—	—	—	—	4.2	49.4	
Office of Economic Opportunity	—	—	—	—	—	4.2	49.4	
Community environment	—	—	—	—	—	—	—	
Open space land (HUD)	—	—	—	—	—	—	—	
Community facilities	—	—	—	—	—	—	—	
Community planning and administration	—	(6)	.3	.1	.1	.1	1.4	
Urban research and technology (HUD)	—	(6)	.3	.1	.1	.1	1.3	
Low income housing demonstration (HUD)	—	—	—	—	—	—	.1	
Low and moderate income housing aids	—	—	—	—	—	—	—	
Maintenance of the housing mortgage market	—	—	.1	.1	.1	.2	.2	
Federal Home Loan Bank Board	—	—	.1	.1	.1	.2	.2	

Actual										Estimate	
1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
123.7	129.5	139.2	150.9	169.6	196.6	215.6	226.9	229.6	239.5	257.4	262.2
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
123.7	129.5	139.2	150.9	169.6	196.6	215.6	226.9	229.6	239.5	257.4	262.2
80.0	85.0	90.8	98.4	111.5	132.6	146.0	155.6	156.4	161.3	172.1	172.6
33.1	35.7	37.9	41.5	46.8	51.7	55.8	56.3	58.3	60.4	68.0	72.5
8.9	8.1	9.8	9.8	10.0	10.8	12.3	13.2	13.1	15.7	15.2	14.9
.5	.3	.3	.7	.7	.7	.7	.8	.8	.9	1.0	1.0
.8	—	—	(6)	.1	.1	.2	.3	.4	.4	.4	.4
.4	.4	.4	.5	.5	.7	.6	.7	.6	.7	.7	.7
(6)	.4	.2	.2	4.5	51.0	42.3	47.3	87.4	88.8	141.6	141.7
—	—	—	—	4.2	49.4	36.7	41.0	77.1	76.2	88.0	93.7
—	—	—	—	4.2	49.4	36.7	41.0	77.1	76.2	88.0	93.7
—	—	—	—	—	—	—	—	.1	.1	.1	.1
—	—	—	—	—	—	—	—	.1	.1	.1	.1
—	—	—	—	—	—	—	—	—	—	—	—
(6)	.3	.1	.1	.1	1.4	5.3	5.9	10.0	12.1	53.1	47.4
(6)	.3	.1	.1	.1	1.3	2.9	4.5	8.7	10.8	51.6	45.0
—	—	—	—	—	.1	2.4	1.4	1.3	1.3	1.5	2.4
—	—	—	—	—	—	—	—	—	—	—	—
—	.1	.1	.1	.2	.2	.3	.4	.3	.4	.4	.5
—	.1	.1	.1	.2	.2	.3	.4	.3	.4	.4	.5

Function, subfunction, and agency program			Actual				
	1960	1961	1960	1963	1964	1965	1966
Income security, total	7.7	10.6	13.8	17.5	22.1	32.3	39.7
Retirement and social insurance	—	—	—	—	—	—	—
Providing or financing medical services	—	—	—	—	—	—	—
Prevention and control of health problems	7.7	10.6	13.8	17.5	22.1	32.3	39.7
Social and Rehabilitation Service (HEW)	5.6	7.9	11.1	14.7	20.3	30.3	37.1
Social Secruity Administration (HEW)	2.1	2.7	2.7	2.8	1.8	2.0	.26
Veterans benefits and services, total	14.6	22.1	27.4	29.9	32.3	36.6	38.4
Income security for veterans	—	—	—	—	—	—	—
Veterans education, training, and rehabilitation	—	—	—	—	—	—	—
Veterans housing	—	—	—	—	—	—	—
Hospital and medical care for veterans	14.6	22.1	27.4	29.9	32.3	36.6	38.4
Medical and prosthetic R&D (VA)	14.6	22.1	27.4	29.9	32.3	36.6	38.4
Other veterans benefits and services	—	—	—	—	—	—	—
International affairs and finance, total	2.2	2.5	6.1	9.7	9.0	17.6	16.3
Conduct of foreign affairs	(6)	(6)	.8	1.6	5.1	5.8	6.8
U.S. Arms Control and Disarmament Agency	—	—	.5	1.5	5.0	5.7	6.7
Departmental funds (State)	(6)	(6)	.3	.1	.1	.1	.1
Economic and financial assistance	2.1	2.3	5.2	7.9	3.3	11.1	9.3
Agency for International Development (State)	2.1	2.3	5.2	7.9	3.0	10.7	8.8
Peace Corps (State)	—	—	—	—	.3	.4	.5
Foreign information and exchange activities	.1	.2	.1	.2	.6	.7	.2
U.S. Information Agency	.1	.2	.1	.2	.6	.7	.2
Food for Peace	—	—	—	—	—	—	—

	Actual									Estimate	
961	1960	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
10.6	13.8	17.5	22.1	32.3	39.7	41.7	48.7	47.9	50.7	61.6	72.2
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
10.6	13.8	17.5	22.1	32.3	39.7	41.7	48.7	47.9	50.7	61.6	72.2
7.9	11.1	14.7	20.3	30.3	37.1	37.9	43.0	40.8	38.6	48.6	57.6
2.7	2.7	2.8	1.8	2.0	.26	3.8	5.7	7.1	12.2	13.0	14.6
22.1	27.4	29.9	32.3	36.6	38.4	41.3	44.1	49.8	58.1	61.3	62.0
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
22.1	27.4	29.9	32.3	36.6	38.4	41.3	44.1	49.8	58.1	61.3	62.0
22.1	27.4	29.9	32.3	36.6	38.4	41.3	44.1	49.8	58.1	61.3	62.0
—	—	—	—	—	—	—	—	—	—	—	—
2.5	6.1	9.7	9.0	17.6	16.3	20.2	20.1	20.4	29.3	33.4	33.4
(5)	.8	1.6	5.1	5.8	6.8	7.9	8.0	7.0	7.3	6.0	5.5
—	.5	1.5	5.0	5.7	6.7	7.8	7.9	6.9	7.2	5.7	4.8
(5)	.3	.1	.1	.1	.1	.1	.1	.1	.1	.4	.7
2.3	5.2	7.9	3.3	11.1	9.3	12.2	11.9	13.2	21.8	27.2	27.7
2.3	5.2	7.9	3.0	10.7	8.8	11.7	11.5	12.9	21.4	27.0	27.5
—	—	—	.3	.4	.5	.5	.4	.3	.4	.2	.2
.2	.1	.2	.6	.7	.2	.1	.2	.2	.2	.2	.2
.2	.1	.2	.6	.7	.2	.1	.2	.2	.2	.2	.2
—	—	—	—	—	—	—	—	—	—	—	—

Function, subfunction, and agency program	Actual							
	1960	1961	1962	1963	1964	1965	1966	1967
General government, total	1.3	.7	.7	.7	.7	.7	1.7	2.1
Legislative functions	—	—	—	—	—	—	—	—
Judicial functions	—	—	—	—	—	—	—	—
Executive direction and management	—	—	—	—	—	—	1.1	1.1
Office of Science and Technology	—	—	—	—	—	—	1.1	1.1
Central fiscal operations	.2	.3	.3	.4	.4	.4	.4	.6
Bureau of Engraving and Printing (Treasury)	.2	.3	.3	.4	.4	.4	.4	.6
Central property and records management	.9	.2	.1	—	—	—	—	—
General Services Administration	.9	.2	.1	—	—	—	—	—
Central personnel management	.2	.2	.2	.2	.1	.2	.1	.1
Civil Service Commission	.2	.2	.2	.2	.1	.2	.1	.1
Law enforcement and justice	—	—	—	—	—	—	—	.2
Law Enforcement Assistance Administration (Justice)	—	—	—	—	—	—	—	—
Bureau of Narcotics and Dangerous Drugs (Justice)	—	—	—	—	—	—	—	—
Federal Bureau of Investigation (Justice)	—	—	—	—	—	—	—	.2
Bureau of Prisons (Justice)	—	—	—	—	—	—	—	—

[1] Mental health, health services R&D, research in hosoital construction, national health statistics, scientific activities overseas.
[2] Maternal and child health, patient care and special health services, Indian health services.
[3] Data are lacking in sufficient detail to divide between HSMHT and EPA the R&D dollars previous to 1970 that were under EHS and its predecessor
[4] Disease control. Data shown for HSMHA (disease control) for the current (1970-72) period includes elements of environmental health formerly und
The remainder of the EHS environmental health program plus all of the air pollution program is included under EPA for the 1970-72 period.
[5] Figures do not reflect congressional action on SST development funds for the last three months of fiscal year 1971, or any action for fiscal year 1
[6] Less than $50,000.
[7] Excludes health and safety research in mining.
NOTE: This table is based on the current Federal organizational structure. R&D programs currently sponsored by the various agencies are reported a
back to 1960. In moving from present agency jurisdiction over R&D programs back through the early 1960's when many of the present agency units di
the allocation of dollars.
Sources: National Science Foundation; Office of Management and Budget

Actual					Estimate					
1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
.7	.7	.7	.7	1.7	2.1	3.4	7.8	7.2	16.8	23.4
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	1.1	1.1	1.2	1.8	1.9	2.2	2.3
—	—	—	—	1.1	1.1	1.2	1.8	1.9	2.2	2.3
.3	.4	.4	.4	.4	.6	.8	.6	.6	.9	.9
.3	.4	.4	.4	.4	.6	.8	.6	.6	.9	.9
.1	—	—	—	—	—	.2	.3	.5	.2	.3
.1	—	—	—	—	—	.2	.3	.5	.2	.3
.2	.2	.1	.2	.1	.1	.3	.2	.3	.3	.3
.2	.2	.1	.2	.1	.1	.3	.2	.3	.3	.3
—	—	—	—	—	.2	.6	4.5	3.6	12.8	19.3
—	—	—	—	—	—	—	3.3	2.5	10.3	17.1
—	—	—	—	—	—	.3	.8	.8	1.4	1.5
—	—	—	—	—	.2	.2	.2	.2	.8	.5
—	—	—	—	—	—	.1	.2	.2	.2	.2

ational health statistics, scientific activities overseas.
n health services.
he R&D dollars previous to 1970 that were under EHS and its predecessors.
(1970-72) period includes elements of environmental health formerly under the purview of HEW's Environmental Health Services (EHS).
pollution program is included under EPA for the 1970-72 period.
or the last three months of fiscal year 1971, or any action for fiscal year 1972.

. R&D programs currently sponsored by the various agencies are reported as under the sponsorship of those same agencies for the years
ns back through the early 1960's when many of the present agency units did not exist, it was sometimes necessary to make estimates in

Table C–3. Total Federal outlays by function, fiscal years 1960–72

(Dollars in millions)

Function	1960	1961	1962	1963	1964	1965	1966	1967
Total	$92,223	$97,795	$106,813	$111,311	$118,584	$118,430	$134,652	$158,25
Interest	8,299	8,108	8,321	9,215	9,810	10,357	11,285	12,58
Special allowances	—	—	—	—	—	—	—	
Undistributed adjustments	−2,297	−2,449	−2,513	−2,644	−2,877	−3,109	−3,364	−3,93
Subtotal, all functions	86,221	92,136	101,005	104,740	111,651	111,182	126,731	149,60
National defense	45,908	47,381	51,097	52,257	53,591	49,578	56,785	70,08
Income security	18,150	21,202	22,530	24,084	25,110	25,702	29,016	31,16
Health	756	873	1,139	1,393	1,737	1,730	2,543	6,72
Commerce and transportation	4,794	5,068	5,430	5,765	6,511	7,399	7,171	7,59
Veterans benefits and services	5,426	5,688	5,625	5,520	5,681	5,722	5,920	6,89
Education and manpower	1,113	1,253	1,406	1,502	1,751	2,284	4,258	5,85
Agriculture and rural development	3,332	3,340	4,123	5,139	5,185	4,807	3,679	4,37
General government	1,327	1,491	1,650	1,810	2,040	2,210	2,292	2,51
Community development and housing	971	191	589	−880	−185	288	2,644	2,61
Natural resources	999	1,548	1,665	1,483	1,944	2,028	1,999	1,82
International affairs and finance	3,054	3,357	4,492	4,115	4,117	4,340	4,490	4,54
Space research and technology	401	744	1,257	2,552	4,170	5,091	5,933	5,42

Source: Office of Management and Budget

Table C–4. Percent distribution of total Federal outlays by function, fiscal years

Function	1960	1961	1962	1963	1964	1965	1966	1967
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
National defense	53.2	51.4	50.6	49.9	48.0	44.6	44.8	46.8
Income security	21.1	23.0	22.3	23.0	22.5	23.1	22 9	20.8
Health	.9	.9	1.1	1.3	1.6	1.6	2.0	4.5
Commerce and transportation	5.6	5.5	5.4	5.5	5.8	6.7	5.7	5.1
Veterans benefits and services	6.3	6.2	5.6	5.3	5.1	5.1	4.7	4.6
Education and manpower	1.3	1.4	1.4	1.4	1.6	2.1	3.4	3.9
Agriculture and rural development	3.9	3.6	4.1	4.9	4.6	4.3	2.9	2.9
General government	1.5	1.6	1.6	1.7	1.8	2.0	1.8	1.7
Community development and housing	1.1	.2	.6	−.8	−.2	.3	2.1	1.7
Natural resources	1.2	1.7	1.6	1.4	1.7	1.8	1.6	1.2
International affairs and finance	3.5	3.6	4.4	3.9	3.7	3.9	3.5	3.0
Space research and technology	.5	.8	1.2	2.4	3.7	4.6	4.7	3.6

Source: National Science Foundation; Office of Management and Budget

Table C–3. Total Federal outlays by function, fiscal years 1960–72

(Dollars in millions)

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971 (est.)	1972 (est.)
$106,813	$111,311	$118,584	$118,430	$134,652	$158,254	$178,833	$184,548	$196,588	$212,755	$229,232
8,321	9,215	9,810	10,357	11,285	12,588	13,744	15,791	18,312	19,433	19,687
—	—	—	—	—	—	—	—	—	800	5,969
−2,513	−2,644	−2,877	−3,109	−3,364	−3,936	−4,499	−5,117	−6,380	−7,197	−7,771
101,005	104,740	111,651	111,182	126,731	149,602	169,588	173,874	184,656	199,719	211,347
51,097	52,257	53,591	49,578	56,785	70,081	80,517	81,232	80,295	76,443	77,512
22,530	24,084	25,110	25,702	29,016	31,164	34,108	37,699	43,790	55,546	60,739
1,139	1,393	1,737	1,730	2,543	6,721	9,672	11,696	12,995	14,928	16,010
5,430	5,765	6,511	7,399	7,171	7,594	8,094	7,921	9,310	11,442	10,937
5,625	5,520	5,681	5,722	5,920	6,897	6,882	7,640	8,677	9,969	10,644
1,406	1,502	1,751	2,284	4,258	5,853	6,739	6,525	7,289	8,300	8,808
4,123	5,139	5,185	4,807	3,679	4,376	5,943	6,221	6,201	5,262	5,804
1,650	1,810	2,040	2,210	2,292	2,510	2,561	2,866	3,336	4,381	4,970
589	−880	−185	288	2,644	2,616	4,076	1,961	2,965	3,858	4,495
1,665	1,483	1,944	2,028	1,999	1,821	1,655	2,081	2,480	2,636	4,243
4,492	4,115	4,117	4,340	4,490	4,547	4,619	3,785	3,570	3,586	4,032
1,257	2,552	4,170	5,091	5,933	5,423	4,721	4,247	3,749	3,368	3,151

Percent distribution of total Federal outlays by function, fiscal years 1960–72

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971 (est.)	1972 (est.)
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
50.6	49.9	48.0	44.6	44.8	46.8	47.5	46.7	43.5	38.3	36.7
22.3	23.0	22.5	23.1	22 9	20.8	20.1	21.7	23.7	27.8	28.7
1.1	1.3	1.6	1.6	2.0	4.5	5.7	6.7	7.0	7.5	7.6
5.4	5.5	5.8	6.7	5.7	5.1	4.8	4.6	5.0	5.7	5.2
5.6	5.3	5.1	5.1	4.7	4.6	4.1	4.4	4.7	5 0	5.0
1.4	1.4	1.6	2.1	3.4	3.9	4.0	3.8	3.9	4.2	4.3
4.1	4.9	4.6	4.3	2.9	2.9	3.5	3.6	3.4	2.6	2.1
1.6	1.7	1.8	2.0	1.8	1.7	1.5	1.6	1.8	2.2	2.4
.6	−.8	−.2	.3	2.1	1.7	2.4	1.1	1.6	1.9	2.1
1.6	1.4	1.7	1.8	1.6	1.2	1.0	1.2	1.3	1.3	2.0
4.4	3.9	3.7	3.9	3.5	3.0	2.7	2.2	1.9	1.8	1.9
1.2	2.4	3.7	4.6	4.7	3.6	2.8	2.4	2.0	1.7	1.5

Table C–5. Federal R&D expenditures by function, fiscal years

(Dollars in millions)

Function	1960	1961	1962	1963	1964	1965	1966
Total	$7,300.5	$8,747.9	$9,831.6	$11,338.5	$13,758.9	$13,811.4	$14,970.2
National defense	6,317.8	7,351.4	7,747.7	7,869.5	8,665.2	7,864.0	7,887.9
Space research and technology	346.6	646.1	1,142.7	2,327.0	3,733,2	4,562,0	5,360.6
Health	277.5	321.7	447.1	557.0	704.4	621.3	753.7
Commerce and transportation	85.1	99.9	108.0	140.2	144.5	184.2	241.5
Education and manpower	68.6	87.5	111.6	132.3	179.9	183.5	231.8
Natural resources	73.6	82.1	96.7	115.5	116.3	135.3	150.7
Agriculture and rural development	105.2	123.7	129.5	139.2	150.9	169.6	196.6
Community development and housing	—	(1)	.4	.2	.2	4.5	51.0
Income security	7.7	10.6	13.8	17.5	22.1	32.3	39.7
Veterans benefits and services	14.6	22.1	27.4	29.9	32.3	36.6	38.4
International affairs and finance	2.2	2.5	6.1	9.7	9.0	17.6	16.3
General government	1.3	.7	.7	.7	.7	.7	1.7

[1] Less than $50,000.

Sources: National Science Foundation; Office of Management and Budget

Table C–6. Percent distribution of Federal R&D expenditures by functio

Function	1960	1961	1962	1963	1964	1965	1966
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
National defense	86.5	84.0	78.8	69.4	63.0	56.9	52.7
Space research and technology	4.7	7.4	11.6	20.5	27.1	33.0	35.8
Health	3.8	3.7	4.5	4.9	5.1	4.5	5.0
Commerce and transportation	1.2	1.1	1.1	1.2	1.1	1.3	1.6
Education and manpower	.9	1.0	1.1	1.2	1.3	1.3	1.5
Natural resources	1.0	0.9	1.0	1.0	0.8	1.0	1.0
Agriculture and rural development	1.4	1.4	1.3	1.2	1.1	1.2	1.3
Community development and housing	—	(1)	(1)	(1)	(1)	(1)	.3
Income security	.1	.1	.1	.2	.2	.2	.3
Veterans benefits and services	.2	.3	.3	.3	.2	.3	.3
International affairs and finance	(1)	(1)	.1	.1	.1	.1	.1
General government	(1)	(1)	(1)	(1)	(1)	(1)	(1)

[1] Less than 0.05 percent.

Source: National Science Foundation; Office of Management and Budget

Table C–5. Federal R&D expenditures by function, fiscal years 1960–72

(Dollars in millions)

1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971 (est.)	1972 (est.)
$7,300.5	$8,747.9	$9,831.6	$11,338.5	$13,758.9	$13,811.4	$14,970.2	$16,073.0	$16,333.3	$15,695.4	$15,155.5	$15,366.1	$15,711.5
6,317.8	7,351.4	7,747.7	7,869.5	8,665.2	7,864.0	7,887.9	8,856.6	9,352.7	9,058.0	8,783,7	8,860.9	8,998.1
346.6	646.1	1,142.7	2,327.0	3,733,2	4,562,0	5,360.6	5,137.1	4,597.6	4,186.4	3,698,8	3,318.9	3,109.4
277.5	321.7	447.1	557.0	704.4	621.3	753.7	881.9	1,081.0	1,045.4	1,117.3	1,250.2	1,348.4
85.1	99.9	108.0	140.2	144.5	184.2	241.5	340.3	331.2	336.6	410.5	601.9	761.5
68.6	87.5	111.6	132.3	179.9	183.5	231.8	320.1	381.2	404.6	427.1	496.1	621.7
73.6	82.1	96.7	115.5	116.3	135.3	150.7	173.7	199.0	221.4	244.5	266.0	277.7
105.2	123.7	129.5	139.2	150.9	169.6	196.6	215.6	226.9	229.6	239.5	257.4	262.2
—	(1)	.4	.2	.2	4.5	51.0	42.3	47.3	87.4	88.8	141.6	141.7
7.7	10.6	13.8	17.5	22.1	32.3	39.7	41.7	48.7	47.9	50.7	61.6	72.2
14.6	22.1	27.4	29.9	32.3	36.6	38.4	41.3	44.1	49.8	58.1	61.3	62.0
2.2	2.5	6.1	9.7	9.0	17.6	16.3	20.2	20.1	20.4	29.3	33.4	33.4
1.3	.7	.7	.7	. .7	.7	1.7	2.1	3.4	7.8	7.2	16.8	23.4

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Table C–6. Percent distribution of Federal R&D expenditures by function, fiscal years 1960–72

1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971 (est.)	1972 (est.)
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
86.5	84.0	78.8	69.4	63.0	56.9	52.7	55.1	57.3	57.7	58.0	57.7	57.3
4.7	7.4	11.6	20.5	27.1	33.0	35.8	32.0	28.1	26.7	24.4	21.6	19.8
3.8	3.7	4.5	4.9	5.1	4.5	5.0	5.5	6.6	6.7	7.4	8.1	8.6
1.2	1.1	1.1	1.2	1.1	1.3	1.6	2.1	2.0	2.1	2.7	3.9	4.8
.9	1.0	1.1	1.2	1.3	1.3	1.5	2.0	2.3	2.6	2.8	3.2	4.0
1.0	0.9	1.0	1.0	0.8	1.0	1.0	1.1	1.2	1.4	1.6	1.7	1.8
1.4	1.4	1.3	1.2	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.7	1.7
—	(1)	(1)	(1)	(1)	(1)	.3	.3	.3	.6	.6	.9	.9
.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.3	.4	.5
.2	.3	.3	.3	.2	.3	.3	.3	.3	.3	.4	.4	.4
(1)	(1)	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	.1	.1

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